FRESH AIR AND HOW TO USE IT

CARRINGTON

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Fresh Air and How to Use It

By

THOMAS SPEES CARRINGTON, M.D.

A house among the leaves, twelve feet above the ground, for open-air living and sleeping. (For a description see page 163.)

FRESH AIR
AND
HOW TO USE IT

BY
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THE NATIONAL ASSOCIATION FOR THE STUDY
AND PREVENTION OF TUBERCULOSIS
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Preface

There is no point at which the campaign against tuberculosis has had a more beneficial effect on popular opinion than in the change of attitude toward the value of fresh air both in health and disease. Emphasized first as an agent of cure, the public is now beginning to recognize its value as a mode of prevention.

There has resulted a demand for advice and information as to methods of obtaining fresh air which the National Association for the Study and Prevention of Tuberculosis is endeavoring to meet by the publication of the present volume. In preparing this book Dr. Carrington has kept constantly in mind the practical difficulties which the modern house dweller must meet in his attempt to avoid the evils of our present methods of construction. These difficulties serve also to emphasize the profound ignorance which surrounds the whole question of interior ventilation. No other problem of public hygiene is more in need of thorough investigation. The present widespread interest in the subject affords ground for hope that such investigation will not be long delayed.

Livingston Farrand, M.D.,
Executive Secretary

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Introduction

The Relation of Fresh Air to Health

THE interiors of the majority of homes in northern countries are breeding places for disease, because of the difficulties in the way of and the objection to admitting fresh air. Foul air which is full of poisonous gases exhaled from the lungs of the inmates, is the usual atmosphere of the home, and it cannot be otherwise when our houses are built to be closed as tightly as possible.

Today fresh air is a recognized remedy for pneumonia and tuberculosis and it is also known to be a preventive of diseases generally. It is essential to good health and for this reason it is necessary to make arrangements for obtaining it in every enclosed space used as a shelter by human beings. Buildings should be ventilated so that it will be impossible for those who use them to rebreathe the air which has been expelled from their lungs.

It is a common mistake to confuse heat and bad air or cold and good air. The fact is, the atmosphere may be below the freezing point and still be very bad or it may be above ninety degrees and yet be perfectly pure.

There are apparently three distinct causes which have contributed to the shut-in existence of the human family. First, the need for warmth and comfort during the long winters in northern climates; second, the fear of night

air found among people living in warm or tropical countries; and third, the necessity during past ages of building a home that would withstand the attack of enemies.

In all countries where the winters are severe, man's ideal shelter has been one that would insure the best protection from the cold, but unfortunately this protection has been gained by excluding fresh air. Even today, with all our modern inventions, we cannot produce proper ventilation without losing a large percentage of heat; so the poor, in the attempt to prevent the waste of fuel, make their living rooms as near air-tight as they can.

In the north, fresh air is shut out in order to obtain a comfortable temperature. In the south, it is shut out to prevent malarial fevers. Millions of people in malarial countries still believe that night air is the carrier of deadly disease, and they use every means to keep it out of their homes by closing windows and doors as soon as the sun disappears in the west. This idea holds in all parts of the world. It is not unusual to find whole communities closing their houses carefully as soon as the sun goes down, and not opening them again until morning. This prejudice against night air should today be banished from the mind, for, since the discovery that the mosquito is the carrier of tropical fever and not the night air, it may be stated with authority that man may breathe fresh night air with impunity if he protects himself from insects. Outdoor air is much purer in a given location at night than it is during the day. The atmosphere is cleansed by the precipitation of dew and frost, for moisture as it drops to

the earth carries with it from the air the particles of dust and smoke which pollute it. When there is no wind the atmosphere is also cleared by gravity, the particles of dirt settling slowly to the earth. Fresh, cold night air stimulates and tones up the body and induces healthy sleep, which is normally followed by renewed strength and a fresh mental outlook upon life.

The purpose of this book is to show how we may improve our health by using larger quantities of fresh, pure air, for we know that pure air is an absolute necessity to human beings and carries life-sustaining properties. Knowing that people under present economic conditions must live in the surroundings fixed by their income, it is intended here to accept living conditions as they are and to point out practical means of obtaining fresh air with as little trouble and expense as possible.

Overcrowding is the usual plight of the families among the poor. The great middle class have little or no extra money to put into new equipment, and the rich often object to the discomfort produced by alterations and the trouble of installing a ventilating system; therefore, theoretical and technical considerations on the subject of ventilation are passed over in this treatise, and the practical use of such means as are at hand will be described, and suggestions offered for their better service. It may not be possible to show this to the entire satisfaction of all, but it is hoped that the material offered will be of some help to those endeavoring to improve the prevailing conditions of their homes.

CHAPTER I

Ventilation

Fresh Air a Necessity

VENTILATION is the process of introducing fresh air into and removing foul air from an enclosed space. If the fact is accepted that *fresh air is a necessity*, the problem of ventilation or of obtaining large quantities of fresh air in dwellings and places of labor is a fundamental one, and should not be neglected.

If an individual requires about three thousand cubic feet of fresh air every hour, as many authorities maintain, a large room twenty feet long by fifteen feet wide and ten feet high, having a cubic capacity of just three thousand cubic feet, contains only sufficient pure air for one hour's use. Therefore, a large room even when occupied by only one person cannot have a healthy atmosphere for more than a comparatively short time unless there are some means by which a current of air can be made to pass through it.

The Danger of Overheating

The air in a dwelling is dangerous to health when it becomes overheated, abnormally dry, or loaded with impurities. Heat is thrown off by the human body in quantities

large enough to be easily estimated and from one person is sufficient to raise the temperature of a room twelve feet square about one degree Fahrenheit in an hour. This may seem an unimportant matter, but in practice has serious results, as the temperature of an apartment may be raised four or five degrees in a short time by a few individuals.

When the air is raw and too cold out of doors to permit the windows of a dwelling to be opened with comfort, but not so cold as to necessitate the house being heated, a number of persons will often gather in one room in order that the warmth of their bodies may produce a comfortable temperature. The atmosphere of rooms heated in this manner soon becomes foul and unhealthy. Lamps and gas burners also raise the temperature of a room very rapidly, and one of these will remove about the same amount of oxygen from the air and produce as much heat as three or four persons. Heated air and gases from the lungs and bodies, being warmer than the surrounding atmosphere, rise and are held in suspension below the ceiling in a closed room. This layer of foul air is more or less deep and gradually fills the entire room. Such a condition of the atmosphere is very unhealthy and persons remaining in it soon become drowsy, yawn, and complain of headache.

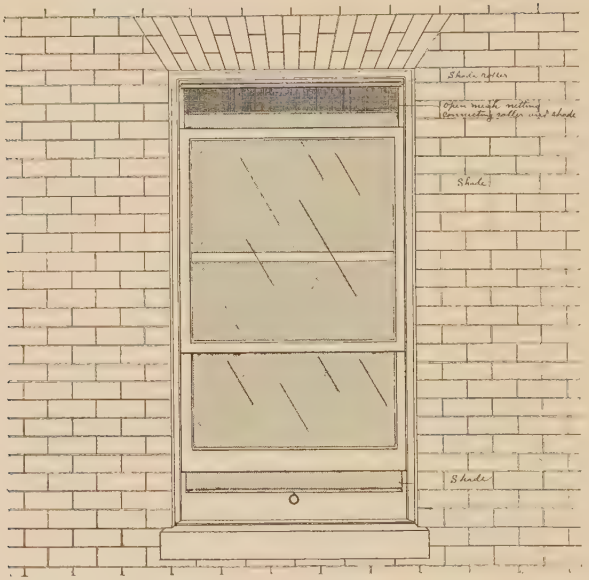
How Air Enters Apartments

Under present housing conditions the air finds its way into and from dwellings through open windows, doors,

transoms, registers, fire-places, chimney flues, and various ventilating devices, also by leakage around windows and doors, and by passing through the building material itself. After entering through these openings the fresh air is mixed with the enclosed atmosphere through the movement of the air due to the wind pressure on the outside of buildings, the tendency of heated air to rise, and of all gases to intermingle or diffuse.

Simple Methods of Ventilation

Where there is no mechanical apparatus to force air through a building the best way to keep the atmosphere fresh is through open windows with a cross draft. There should be some means of producing cross ventilation in all rooms, and this can be obtained by opening windows, doors, or transoms on opposite sides of an apartment if the various connected rooms or halls have windows on two different sides of a building. Cross ventilation cannot be obtained through windows on one side of a room only or if the other sides are closed. Where there are windows on two sides of a room, good cross ventilation is obtained through small openings made by lowering the upper sash of opposite windows from one to six inches. Where there are windows on only one side of a room an opening should be made above the upper sash and below the lower one also. This arrangement allows the escape of the warm foul air through the opening above the upper sash as the pure cold air enters below.



No. 1.—When the upper window sash is let down and the shade lowered, a larger amount of fresh air may be obtained by inserting a strip of open-mesh netting between the shade and the roller.

The Arrangement of Inside Shades

In order to use effectually an opening above the upper sash of a window for ventilation and lower the inside shade to prevent the room being overlooked from the outside, the shade should be attached to the roller by four or five pieces of tape, each five inches long, or by a heavy mosquito netting of large mesh. This leaves a space between

the roller and the shade through which fresh air can enter, and if it is filled in with a netting of the same color as the shade, such an arrangement is not noticeable nor does it detract from the artistic arrangement of the room. When the shade is drawn down to its full length in order to expose the upper opening there should also be a small opening between the bottom of the shade and the lower casing as shown in Illustration No. 1.

Wind Shields

In admitting fresh air into a room through an opening below the window sash, some kind of wind shield or air deflector is often necessary to protect those sitting near the window from exposure to a direct draft. A shield for this purpose may be made from an ordinary piece of hard wood board three-fourths of an inch thick and eight inches wide, long enough to fit in between the side casings and attached by two small hinges to the lower casing. The shield should be held in position by cords attached to its upper edge and to the casing, leaving an opening three inches wide between it and the window sash. There are a variety of wind shields on the market under the general name of sash ventilators which can be recommended for this purpose.

Flushing Apartments with Fresh Air

A most efficient way to ventilate thoroughly and renew the air of a room is to flush it with fresh outdoor air. In order to obtain a quick flushing cross ventilation is needed

with windows opened from both the top and bottom. A room may be flushed as often as necessary and for any length of time agreeable to the occupants during warm and temperate weather, but in cold weather it must be flushed quickly so as to conserve the latent heat. This is done by opening to the fullest extent for a few moments the windows and doors through which the strongest cross draft can be obtained. Such a flushing will change the air in a few moments, and although the room may seem cold after the openings are closed, the atmosphere soon regains its original temperature. The walls, ceiling, and other objects absorb heat when a room is warm and do not lose it during a short period of flushing, but give it up afterward. The cold air is thus warmed by convection; that is, the air nearest the objects becomes heated and rises, giving place to cooler air which in its turn is heated, this circulation continuing until the atmosphere is again warmed.

Bedroom Ventilation

Fresh air is as essential in the bedroom at night as during the day, and *every one should sleep with windows wide open during all seasons of the year.* A small aperture at the top and bottom of the window does not give a sufficient supply of pure air to the sleeper. Too much emphasis cannot be placed on this phase of the fresh-air problem, for the habit of closing up sleeping rooms at night is prevalent throughout the entire country.

Many persons close and lock their windows at night

through fear of burglars. Where there is reason for such precaution windows of sleeping rooms should be fitted with permanent iron bars or movable iron gratings which can be locked into place at night. If gratings or bars are used, one of the simplest and best methods of obtaining a plentiful supply of fresh air is to remove both the upper and lower window sash and leave the window opening entirely free from glass obstruction at night. The French window, which opens from floor to ceiling by swinging inward, allows an opening of the entire window without the inconvenience of removing the sash, and is to be recommended for ideal sleeping rooms.

Hot Weather Ventilation

While it is very important to obtain fresh air without great loss of heat in cold weather in northern climates, it is equally necessary to supply dwellings with fresh air and keep them cool during the summer months and in warm climates. In tropical countries, windows should be shielded by latticed blinds made of wooden strips, swung far enough out to prevent the sun's rays from striking the glass. During the heat of the day doors and windows are usually closed and the rooms darkened, but at night both living and sleeping rooms should be opened and cross ventilation obtained from as many directions as possible. Careful screening is necessary, and a description of the various methods for obtaining this protection will be found in Chapter VII.

CHAPTER II

Window Tents

Window Tents for Healthy Persons

THE window tent was originally devised in order to give the open-air treatment for tuberculosis to patients in their own homes when they could not procure the use of porches or other open buildings for this purpose. But as window tents have proven both convenient and economical, they are now used by many healthy persons who wish to sleep in the fresh air during the winter months without cooling off their houses. Window tents are all constructed practically on the same principle, the difference between them being largely in their shape and the manner of their manipulation. A frame, usually of steel, supports a canvas cover, and this canopy encloses a space inside the room connected with the window. The tent frame is either attached to the window casing or the head of the bed, and projects over the bed, covering the head and shoulders of the person lying on it.

Home-made Window Tents

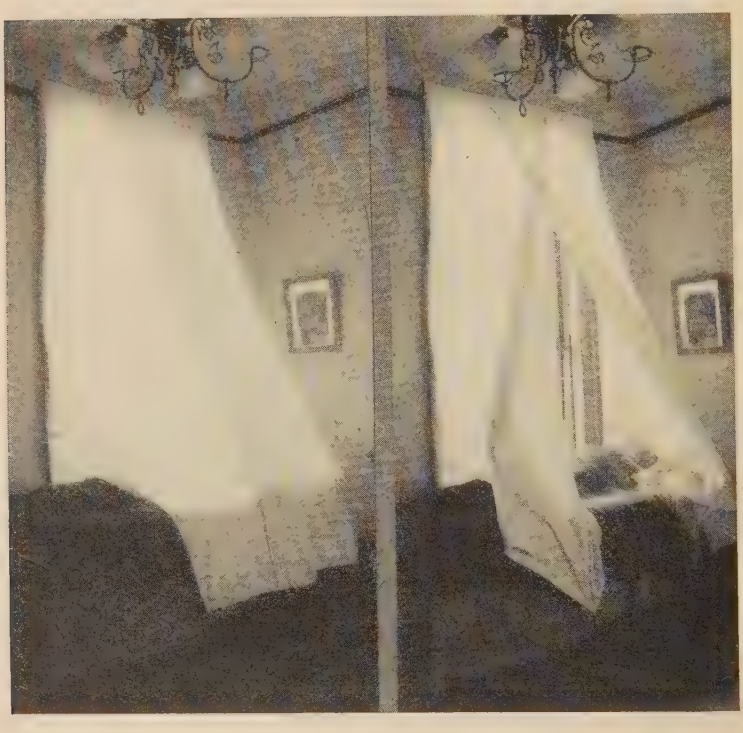
Those desiring to try this method of sleeping in the fresh air can make a temporary home-made window tent,

which gives excellent results, with two bed sheets each nine feet long by four feet wide. Tack one end of each sheet to the top of the inner window casing, overlapping them eighteen inches where they meet at the middle of the window. Carry the lower ends of the sheets to the outer side-rail of the bed, allowing them to fall over the edge of the bed, and attach them by strong tape to screw-eyes inserted into the floor. Then tack the outer sides of the sheets to the outer edge of the inner window casing. The sheets making the window tent should not be pinned or attached in any way to the bedstead or bedding, as it is necessary that the bed covering be allowed to move freely with the sleeper, under the edge of the tent. If desired, any heavy cloth such as canvas or unbleached muslin can be used instead of the sheets, and with the help of Illustration No. 2 the tent can be arranged over any bed near a window in a few moments. If the home-made tent proves satisfactory to the experimenter, a stronger and more convenient manufactured tent should be purchased.

Manufactured Window Tents

These are made in two shapes, those which appear like and work on the principle of the ordinary window awning and those resting on the bed in the form of a box. The Knopf and Allen tents are of the awning variety, and the Farlin, Walsh, Mott, and Aerolo tents are of the box order.

The box tent rests on the bed, and is attached at one

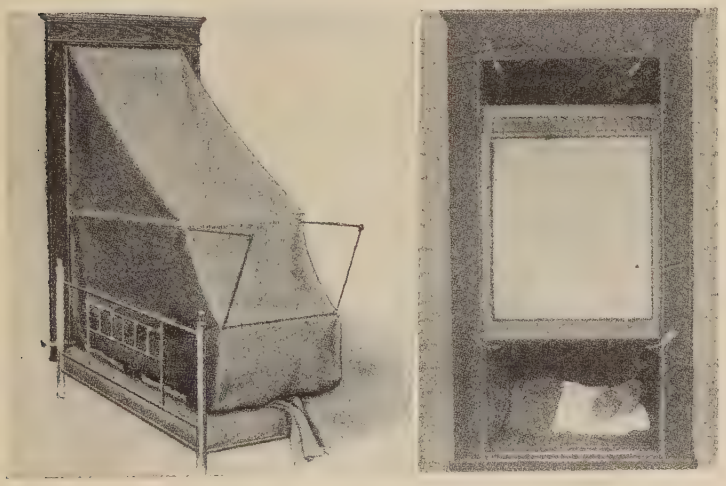


No. 2.—A home-made window tent. This consists of two sheets, nine feet long by four feet wide, tacked to the window casing and fastened with tapes at the lower ends to screw-eyes placed in the floor.

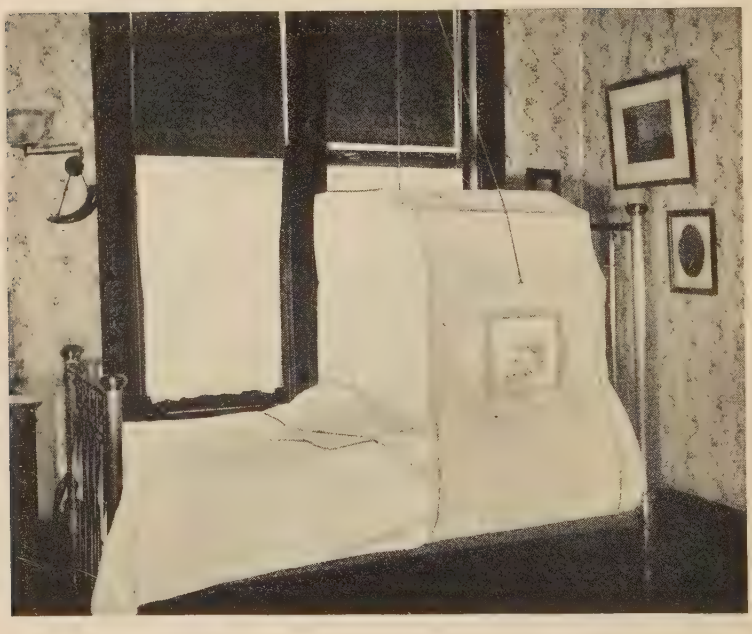
end to the window casing or to the head of the bedstead. They are made with a light frame and covered with canvas. Some have a detachable bottom of tent cloth, with an opening for the head of the sleeper. This can be re-

moved and laundered as often as necessary, as the head rests upon it instead of a pillow-case. It is claimed that the detachable bottom prevents the cold air from reaching the shoulders and body, as the edges of the opening are made in the form of flaps which can be tucked about the neck.

When purchasing a window tent one should remember that its purpose is to supply fresh out-door air to a sleeper indoors without making the bedroom uncomfortably cold, and as it is a device to supply fresh air, it should be made so that the ventilation within it is perfect. Window tents should be inconspicuous from the exterior of the house,



No. 3.—The Allen window tent over a double bed and showing the arrangement of the windows for ventilation from the outside.



No. 4.—Dr. S. A. Knopf's window tent in position, with a person in bed looking through the celluloid window into the room, but breathing outdoor air.

and arranged so that they can be moved easily and placed in position without great difficulty. They should fold neatly against every part of the window, and when not in use swing out of the way so as to permit the usual amount of light and air to enter the room. Shields should be provided with all tents to screen the occupant from storms as well as to protect him from being overlooked from

neighboring windows, and the cover should be detachable so that it can be laundered.

The tent shown in Illustration No. 3 has the appearance of an ordinary window awning turned into the room, and is made to cover the entire window in order to obtain ventilation from openings above the upper and below the lower sash at the same time.

The tent shown in Illustrations Nos. 4 and 5 was de-

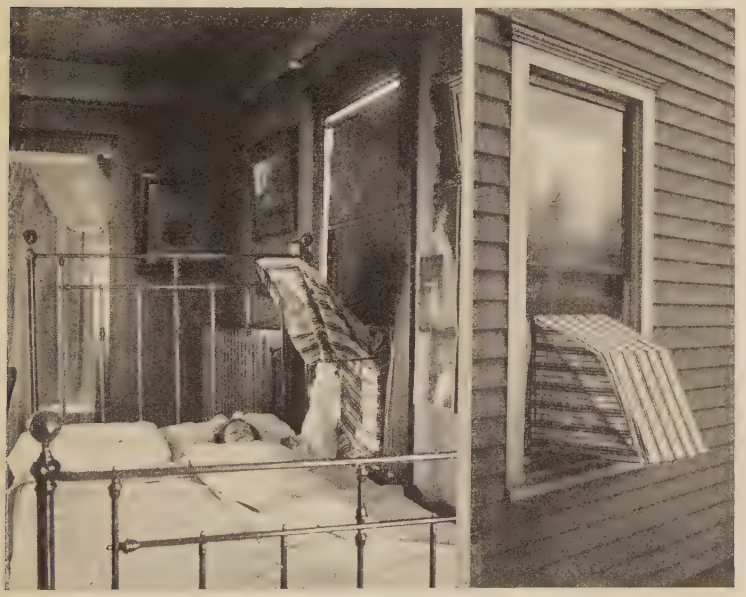
No. 5.—Dr. S. A. Knopf's window tent raised when not in use.

No. 6.—The Walsh window tent over a bed, with a view from the outside showing attachment for holding the tent to the window.

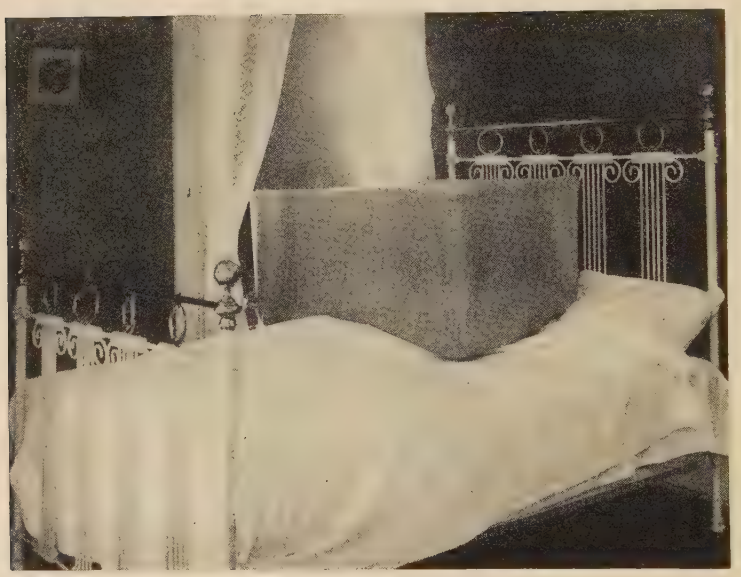
signed by Dr. S. A. Knopf, and can be attached to the side window casing, slightly below the centre of the sash. The frame is of steel and moves on hinged pins screwed to the casing. The cover is made from heavy sail canvas left long enough at the lower end to tuck in under the bedding, in order to prevent the cold air from entering the room. This tent fills half of the window opening.

The tent shown in Illustrations Nos. 6 and 7 is a small cloth box tent for the head, secured to the window by an adjustable frame which fits between the window casing like a wire screen frame. The bottom through which the head is passed is made of flannel and can be drawn closely around the neck.

The tent shown in Illustration No. 8 is supported by a light steel frame, held in place by two small screw-eyes,



No. 7.—The Walsh window tent, raised when not in use, and a view of the outside awning completely lowered.

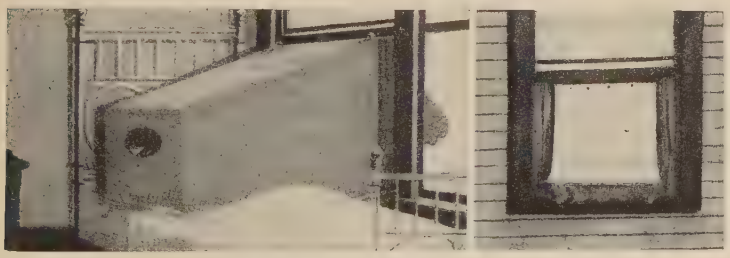


No. 8.—The Mott window tent is supported from the window sill, without an attachment connecting it to the bed.

and will fit any ordinary window from twenty-five to forty-seven inches wide. It is made from a fine grade of army khaki with skirts about twelve inches long, intended to take the place of a false bottom which is not used with this model. This tent appears like a square box supported from the window-sill, and is not attached to the head of the bed. It is supplied with a dark green, coarsely woven cloth screen, to prevent a direct breeze blowing upon the face, and is arranged so that it can be removed

from the window or drawn back against the side out of the way when not in use. In order that the supply of fresh air may be controlled from the interior of the tent, the frame is arranged so that it does not interfere with the movement of the window sash.

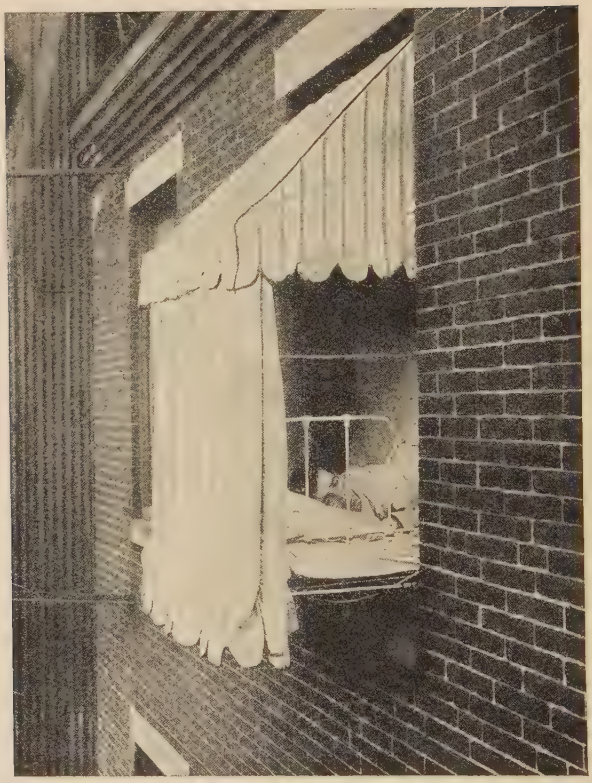
The Aerolo tent is also a square, box-like structure having the same appearance as the tent shown in Illustration No. 8, but attached to the head of the bed instead of the window frame. It is said to be strong enough to



No. 9.—The Farlin window tent resting on a single bed, with a view from the exterior showing the awning protecting the sleeper.

support a blanket which may be thrown over it during very cold weather in order further to isolate the warm room from the outdoor temperature.

The tent shown in Illustration No. 9 has a rust-proof metal frame and is covered with army khaki, and when not in use can be folded up into a small space against the window sash or be removed from the window with little difficulty. It is claimed for this tent that it can be

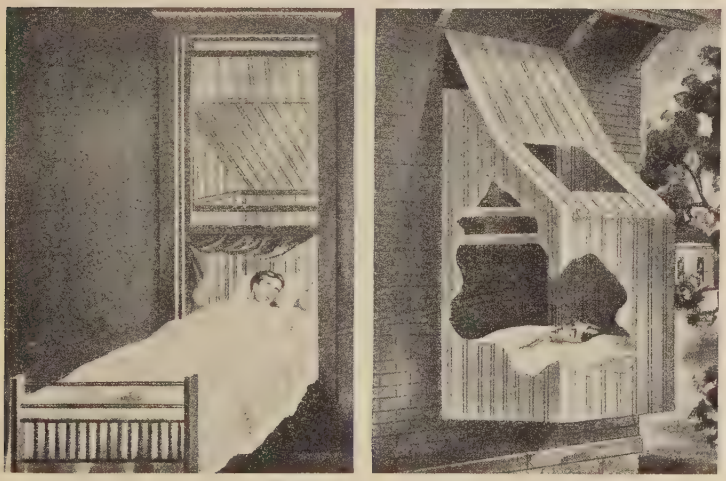


No. 10.—An outside window awning to protect the sleeper lying in bed with his head projecting from the window. (*Courtesy of the Stein Manufacturing Co.*)

regulated to suit any weather condition in a moment by the person inside, and that drafts can be shut out by an outside awning arrangement.

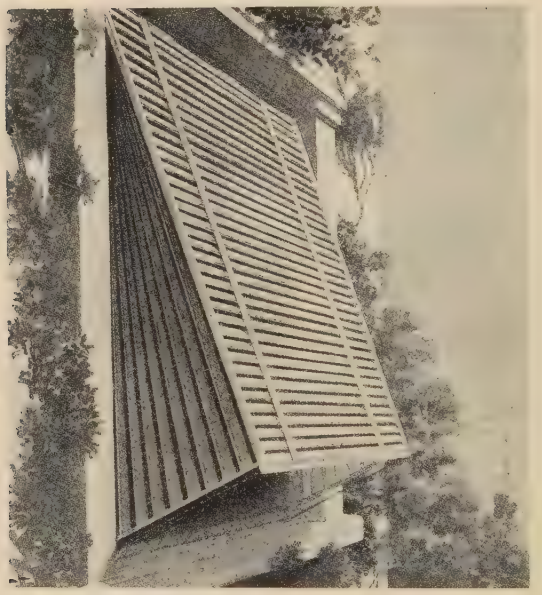
Sleeping with the Head Outside the Window

It is quite possible to sleep in comfort with one's head outside the window. In order to do this, the head of a cot bedstead may be run through the window so that the sleeper's head and shoulders are on the outside. The



No. 11.—The Aërarium, a wooden frame covered with canvas for use as a protection against storms when sleeping with the head outside the window. (*Courtesy of the Lapalme Hoffman Co.*)

lower window sash must be raised about two feet, and a heavy cloth or curtain hung from its lower edge, which will drop across the body and shut off the room from the outside air. In very severe weather the curtain can be tucked around the sleeper's neck, leaving his body prac-



No. 12.—A Venetian blind awning for protecting the sleeper lying in bed with his head outside the window.

tically indoors and in a warm room. In warm weather the curtain can be drawn down toward the feet, in this way placing the body practically outdoors. A bed for this method of sleeping in the open air has been invented by Dr. H. B. Dunham and is shown in Illustration No. 139. The head of the sleeper on the outside of the window should be protected by a canvas awning supported on a

wooden or steel frame. The ordinary awning for shielding windows during the summer months can be used for this purpose, or a practical home-made shelter may be constructed with a wooden frame to which canvas is tacked, as shown in Illustration No. 11. A double awning made for this purpose with openings for proper ventilation

No. 13.—A view from below, showing a curtain around the head of a bed projecting from a window. (*Courtesy of the Stein Manufacturing Co.*)

may be obtained on the market (see Illustration No. 10). For summer a Venetian blind awning made of wooden slats may be used and is to be recommended, as it can be arranged so as to obtain a free current of air without losing the necessary protection (see Illustration No. 12). This means of outdoor sleeping is particularly desirable for persons who have to leave their beds during the night, as the bedrooms can be kept warmer than with the use of the inside window tent.

CHAPTER III

Roof Bungalows

Value of Roof Space for Fresh-air Buildings

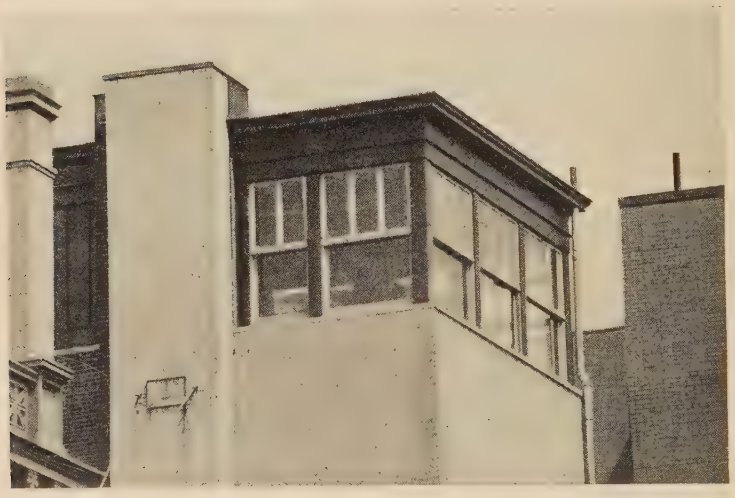
THE great value of roof space for obtaining fresh air in cities is gradually being appreciated. The majority of buildings in cities and towns have either flat roofs or those with only a slight fall, which can be made splendid sites for various kinds of little buildings. The objection to the use of roofs as we find them is that the material which is laid to shed water does not last long if used as a floor. Owners do not care to run the risk of having expensive tin or gravel roofings destroyed by their tenants walking over them. But this objection may be overcome by protecting the roofing material in some way.

The Protection of Roofing Material

A wooden grating is a simple means of protection. This can be made from cheap unplaned lumber, using supporting strips three inches wide by one inch thick and nailing or screwing to them slats two inches wide by one-half inch thick, spacing the slats one inch apart. Wooden gratings should be made in sizes that may be easily

handled, about two feet wide by four feet long, and enough gratings supplied to cover all parts of the roof which are to be used.

Roofs can also be protected by laying two by four inch timbers on edge about two feet apart over the



No. 14.—A permanent fresh-air room constructed of wood and protected with glass and sash windows on the top of a brick building. (*Courtesy of Dr. W. P. Northrup.*)

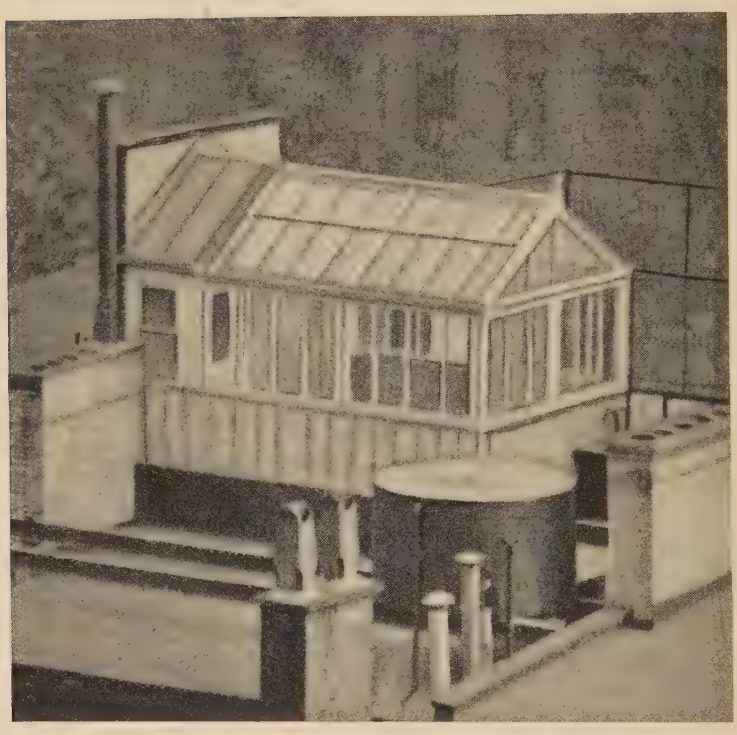
roofing material, and on these nailing ordinary floor boards. A still more simple way of protecting a roof for a short time is by laying large squares of thick linoleum over the space required for building; or two thicknesses of grass matting will answer the same purpose.

Permanent Floors Over Roofing

It is sometimes desirable to lay a permanent floor over the roofing material, and this can be done with metal lath and composition cement flooring. Permanent floors should not be laid directly on the roofing, as moisture from the cement may percolate through, remaining between the roofing and flooring, freeze during the winter, and destroy one or both the materials. Two by four inch planking laid two feet apart will make a good foundation for a permanent floor; to this is tacked expanded metal or metal lath covered by concrete and coated with a composition flooring which, if carefully laid, will wear for years.

Situation and Exposure

The roof of any apartment house offers a choice of situations, and it should be viewed with the idea of selecting the best position before constructing an open-air bungalow. A little careful consideration will show that there are various conditions to be met on the top of all buildings, such as a choice of the best exposure for the open front of the small building; the most protected place; one that cannot be overlooked from neighboring structures; and one which will afford some means of anchorage, so that the shelter will be safe during severe storms. Practically every roof has one or more positions which are favorable for a site, and the most desirable position should be selected when possible. In many buildings a main stairway or elevator shaft ends in a small superstructure



No. 15.—Hollow tile, glass, and sash were used in constructing this fresh-air room on the roof of a brick dwelling.

on the roof. On some are found large water tanks or reservoirs. These additions, high cornices, and wide chimneys can all be used as wind-breaks in winter, and for partial shade during the summer months. Where buildings are high and the roofs are above surrounding structures, or if they are without the projections men-

tioned, the bungalow must be very carefully anchored in order to stand against the wind. On private or one family houses there are often extensions in the rear of the main building which make excellent sites for roof bungalows. Such extension roofs are usually protected by the house on one side and more or less sheltered from high winds by the buildings on adjacent streets.

Choice of Building Materials

Roof bungalows can be constructed of wood, wooden frame covered with sheets of galvanized iron or roofing paper, brick, tile, or reinforced concrete. For one person the structure should be about twelve feet wide by twelve feet deep, and for two persons, sixteen feet wide by twelve feet deep.

Permanent Roof Bungalows

Before deciding upon the material to be used it is well to consider making the bungalow a permanent structure, for these buildings are always useful and add to the value of property. If it is to be a permanent addition, it should be constructed of the same material as used in the building upon which it is erected, and so be incorporated into and form a part of the original structure. For work of such character an architect or builder should be consulted.

Roof bungalows may be constructed of hollow terra-cotta tile or brick laid in cement mortar, and plastered on both the inner and outer sides. A structure of this sort has heat and cold resisting properties, and if fitted

No. 16.—View of a shelter constructed of sheet iron nailed to a wooden frame on the roof of a brick building.

with glass and sash windows, may be used during the entire winter, both day and night, making a satisfactory and permanent building (see Illustrations Nos. 14 and 15). The roof for a permanent building should be of the same material as that used on the structure supporting it, generally either tin or gravel. A well-built brick or tile

bungalow plastered on the interior and closed on the front by glass and sash will cost from three hundred to four hundred dollars.

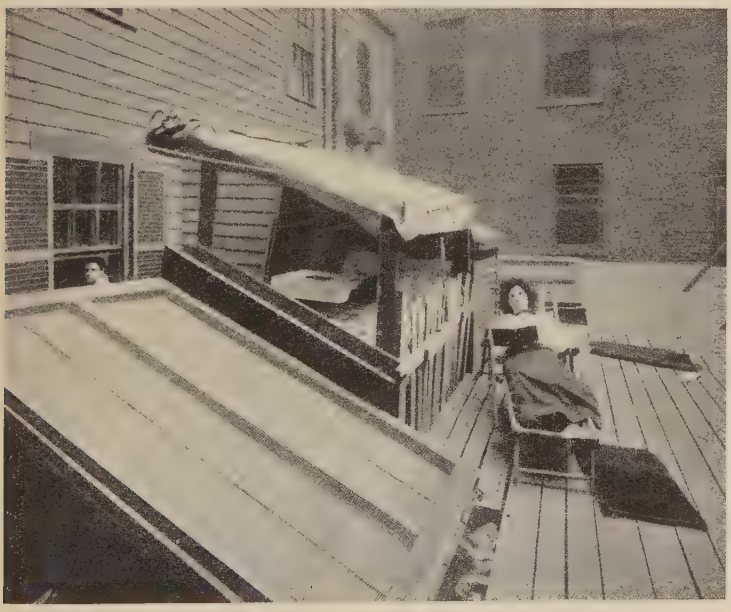
Temporary and Cheap Roof Shelters

If the open building is to be of temporary or cheap construction, it is advisable to use a wooden frame as a

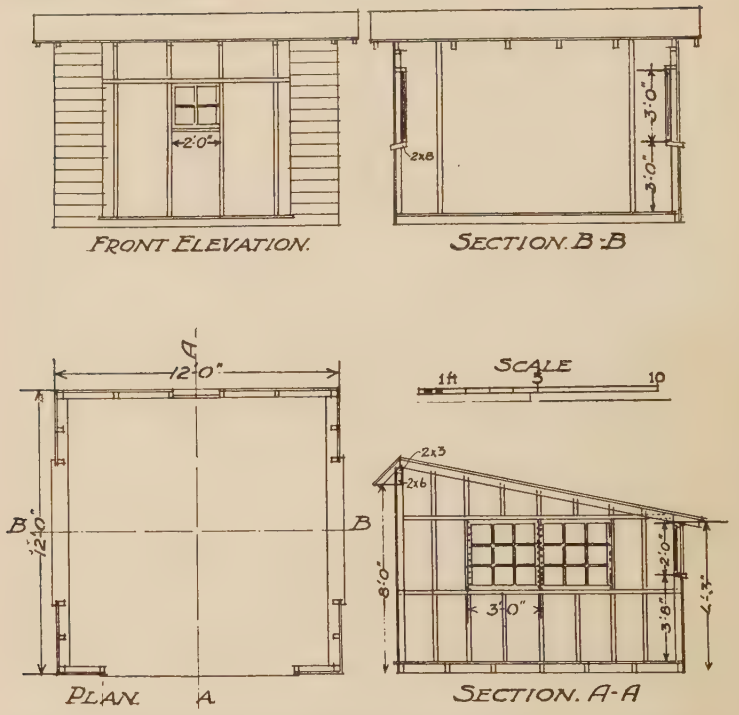
No. 17.—View of a shelter constructed of corrugated iron nailed to a wooden frame on the roof of a brick building.

No. 18.—A cheap roof shelter made of lattice work nailed to a wooden frame, for use in moderate weather.

foundation, for the building can then be moved and its position and exposure changed easily. This frame should be made of two by six inch plank laid flat on the roof, and mortised at the corners. Two by four inch timbers should be used for the upright frame and siding boards for the back and sides. The front of the bungalow should face slightly to the east of south and be left open, but arranged with a canvas curtain tacked on a roller so that it can be



No. 19.—A cheap shelter constructed of wood and canvas on the roof of a tenement house. (*Courtesy of Dr. Joseph H. Pratt.*)

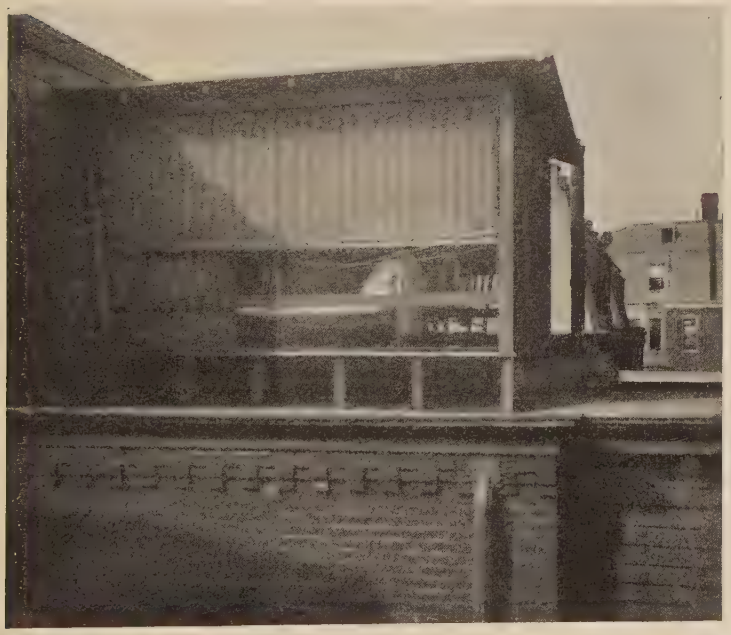


No. 20.—Plans for a wooden roof shelter of the lean-to type, to go with list of materials on page 52. (*Courtesy of Mr. W. H. Scopes.*)

closed in stormy weather. A shack of this kind can be built very cheaply of rough boards and the roof covered with tar paper or other roofing material.

In constructing the framework, uprights of two by four inch timbers should be placed at each corner and the intervening space on both sides and the rear should be

filled by uprights of the same size spaced eighteen inches apart. The front should be eight feet four inches high and the rear six feet four inches high, in order to allow a two-foot fall for the roof. There should be two rows of studs between the uprights made of two by three inch timbers, one three feet and the other six feet from the floor. This framework when completed should be braced if necessary



No. 21.—A temporary wooden open-air shelter of the lean-to type. Built on the roof of an extension, with a side of the main building serving as a windbreak. (*Courtesy of "Country Life in America."*)

in order to obtain a rigid structure to hold the roof. The rafters should be of two by four inch timbers laid eighteen inches apart, and these in turn covered by seven-eighths inch boards and protected by roofing paper or tin. The sides of the building may be covered with roofing paper, clapboards, or patent siding. A bungalow built in this manner may be moved from one point to another on the roof and faced in any direction.

Illustrations Nos. 16, 17, 18, and 19 show various methods of constructing cheap temporary fresh-air quarters on roofs, and if studied, any of these can be erected without further description.

List of Material for a Temporary Roof Shelter

The following list of material and estimate of cost is given for the construction of buildings made of lumber, such as are shown in Illustrations Nos. 20 and 21. These can be built more cheaply by using second-hand lumber and doing the labor one's self.

328 feet of rough lumber as follows, at $30.00 per thousand $9.84

4 pieces, 2 inches by 4 inches by 12 feet, sills,
5 pieces, 2 inches by 4 inches by 12 feet, floor joists,
14 pieces, 2 inches by 3 inches by 14 feet, studs,
5 pieces, 2 inches by 3 inches by 12 feet, plate,
1 piece, 2 inches by 6 inches by 12 feet, plate front,
1 piece, 2 inches by 8 inches by 12 feet, rail for sliding sash,
9 pieces, 2 inches by 4 inches by 14 feet, rafters and rafter tails for front eaves,

Carried forward.... $9.84

Brought forward	$9.84
300 feet of novelty siding for walls at $30.00 per thousand	9.00
250 feet of shiplap roof boards at $26.00 per thousand	6.50
200 feet of 7/8-inch common flooring at $32.00 per thousand	6.40
1/2 roll Neponset Red Rope Roofing at $5.00 per roll	2.50
10 pieces of 1-inch half round for roofing at 1 cent per foot	1.40
1 canvas curtain on roll	5.00
4 sliding sash, 3 feet by 3 feet, at $2.00	8.00
1 casement sash and frame, 2 feet by 2 feet, at $2.00	2.00
Hardware	1.00
Strips for sliding sash	1.00
Paint	5.00
	$61.64
Labor	25.00
	$86.64

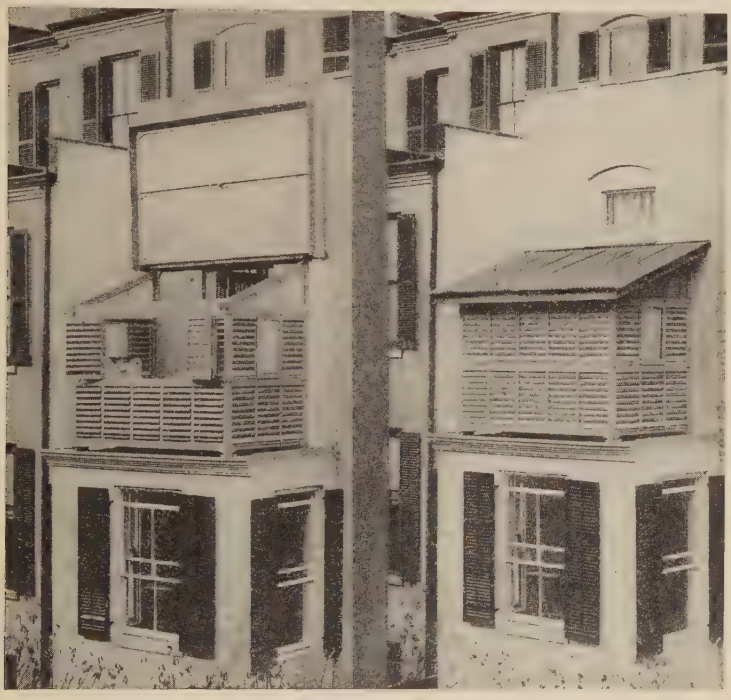
CHAPTER IV

Wall Houses and Iron Frame Porches for City Use

Selecting a Position

WHEN it is undesirable to use the roof of one's home as a site for an open-air bungalow, a choice may be made between an iron frame porch and a wall house opening out from one of the bedrooms. In cities and large towns the fire regulations must be consulted, and usually a permit obtained from the building department for the erection of such quarters, but when fire laws are complied with, this is generally obtainable without difficulty.

In choosing a suitable position for a fresh-air bedroom it should be remembered that early morning sounds and sunlight are to be eliminated if possible. This can sometimes be done by selecting a room as far from the street as possible, and by shading the bed with blinds. As in the case of roofs, there is a choice of sites both on private and apartment houses. One's neighbors should be taken into consideration and a position decided upon, if possible, which does not overlook their windows, porches, or yards. Many city buildings have angles, corners, and courts,



No. 22.—Two views of the wall house "Starnook." The roof raised and shutters open to obtain sunlight, and the house closed for outdoor sleeping at night. (*Courtesy of Dr. S. A. Knopf.*)

making breaks in the outer walls which give protection against the direct rays of the sun in summer and heavy winds in the colder seasons. A little study will quickly show the position which is most advantageous. Sometimes new doors or windows will be needed to give access

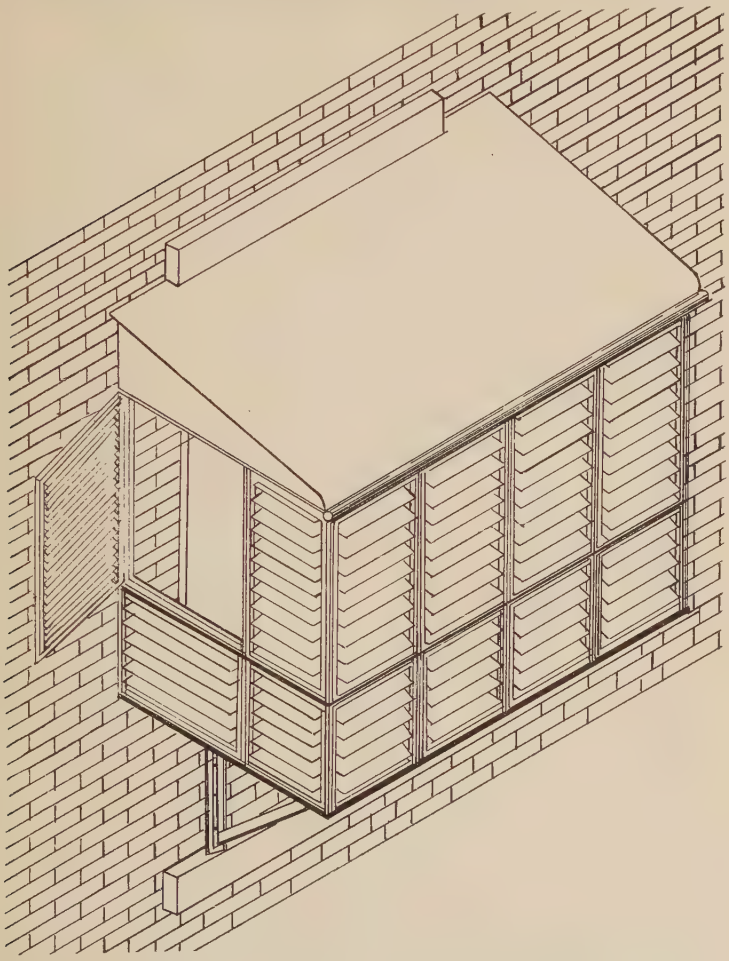
to a desired position on the outside of the building. Frames and wall houses can usually be secured with safety to the walls of buildings at any height, and when strongly supported, there need be no fear in regard to their stability.

The "Starnook" Wall House

The wall house known as Dr. Knopf's "Starnook," shown in Illustration No. 22, can be used in any of these positions, and may be supported by the roof of an extension, columns, or on brackets attached to the walls of the building. This fresh-air room consists of a roof, floor, and three walls, and, with the exception of the roof and floor, is built of steel frames holding movable shutters. The apartment is nine feet long by six feet deep, and the roof is eight feet high at the inner side, with a fall of two feet. At both ends are windows which can be opened outward. A frame filled with glass closes the triangular spaces at the ends under the sloping roof, but there is a narrow space between the top of the walls and the roof which is left open to allow for the circulation of air. The roof can be raised entirely off the apartment by means of a crank and counterweights, and the three upper sections of the front shutters can be opened or closed.

The Phillips Wall House

The Phillips Wall House, shown in Illustrations Nos. 23 and 24, is a fresh-air sleeping room which can be dismantled during the day when not in use, so as to allow the window

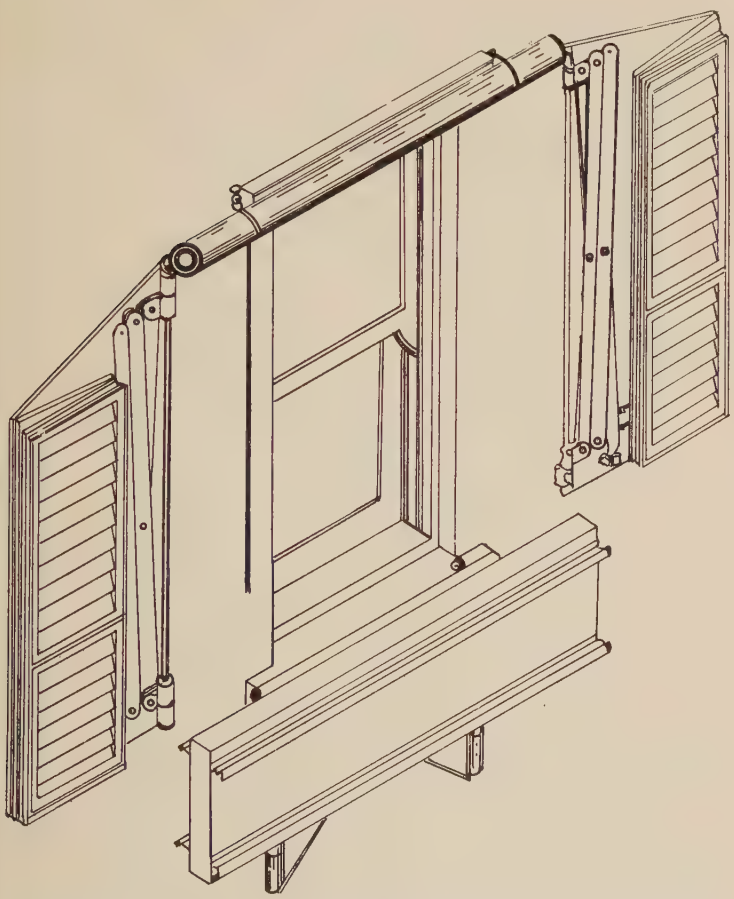


No. 23.—The Phillips folding wall house in place and ready for outdoor sleeping.

or door by which it is entered to be free and receive sunlight. It is supported by steel brackets swung on hinged pins, and, with the exception of the roof, which is covered with sheet-iron or a canvas curtain, the entire room is constructed of steel. The floor is hinged to the wall just below the window-sill, and can be dropped like a movable shelf by means of a lever. The sides and front are enclosed with steel shutters about the size of ordinary wooden blinds used on old-fashioned country houses. These are hinged to each other and when folded together resemble a closed Japanese screen. The room when open and in place and covered by the roof is six feet six inches long by four feet wide and six feet high on the inner side, the roof having a fall of one foot six inches.

An Iron Frame Porch

An iron sleeping porch or frame (see Illustration No. 25) can be built in the same manner as an ordinary fire-escape platform used on tenement houses in large cities. Such a sleeping porch is fireproof, as it is constructed entirely of wrought iron or steel, and should be about ten feet long by five feet wide. The floor is constructed of flat steel bars one and one-half inches wide by three-eighths of an inch thick and spaced one inch apart; this in turn to be covered by composition flooring. The side and end railings are three feet high, the upper rail being made from a flat bar, one and three-fourths inches wide by one-half inch thick. The centre and lower rail are one and one-half inches wide by three-eighths of an inch thick, and

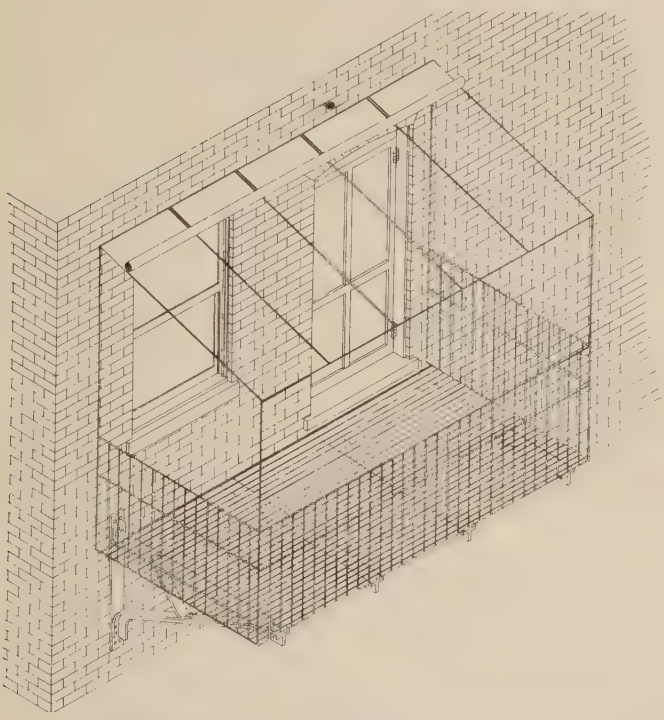


No. 24.—The Phillips folding wall house thrown open to allow sunshine to reach the window through which it is entered.

these are braced by upright cylindrical iron rods one-half inch in diameter. At each corner of the porch is an iron rod supporting a frame upon which a canvas curtain may be laid. The whole porch exclusive of the curtain may be made and placed in position for about fifty dollars, and when fitted with overhead and side canvas curtains can be used in temperate climates for about nine months out of the year, and will be found convenient for other uses when attached to apartment or private houses in large cities.

Iron Porches for Tenement Houses

It is vitally important to the health of thickly settled communities that open porches, where fresh air can be obtained without leaving the home, be provided in connection with the apartments of tenement houses. In many of the smaller cities and towns, where wood is still being used for constructing buildings, back porches, as shown in Illustration No. 27, are planned for as an essential part of an apartment, and temporary wooden porches can be erected like the one shown in Illustration No. 28, but in the larger cities, where fire regulations prohibit the use of inflammable material for building purposes, little has as yet been done to provide porches for new buildings. It is hoped that the time is not far distant when public opinion will bring about the passage of laws compelling those proposing to construct new buildings to add one or more balconies to their plans as part of every apartment.



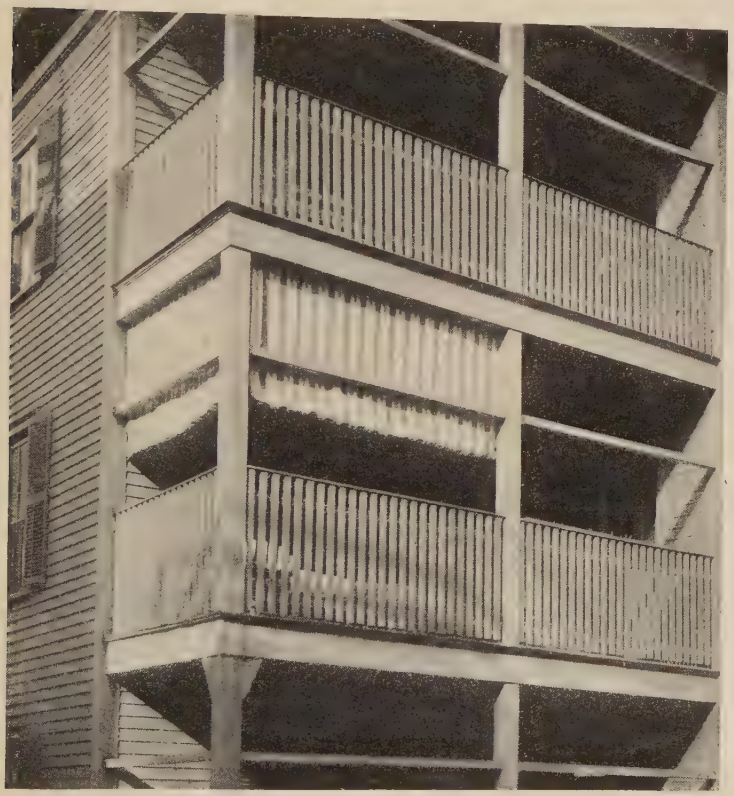
No. 25.—An iron frame sleeping porch for city use, built in the same manner as a fire-escape.

The Vanderbilt Open Stair Tenements

A start in this direction has been made in New York City with the construction of the new Vanderbilt Open Stair Tenements, which are designed to supply each family with a balcony (see Illustration No. 26). These balconies

are made of steel rods supported on heavy artistic steel brackets, with floors of reinforced concrete overlaid with tile. The buildings were constructed for the purpose of

No. 26.—A new method of providing fresh air for the family in a model tenement. Each apartment opens on to an iron balcony.



No. 27.—Permanent fresh-air porches are now supplied in connection with many wooden tenements.

offering to persons who have incipient tuberculosis better hygienic conditions than are to be found in other tenement houses in the city. They consist of four large fireproof

structures and occupy a space of eighteen city lots, facing a park on the East River front between Seventy-seventh and Seventy-eighth Streets. There is a large light and airy court in the centre of each building from which passageways, designed after those used in many European cities, lead to the street on both sides. Outside protected stairways are placed in each corner of the courts in order to do away with the badly ventilated interior halls and

No. 28.—A temporary wooden sleeping porch with glass and sash protection, over the roof of a permanent veranda on the rear of a tenement house.

No. 29.—Open rooms or loggias seen on the rear of tenement houses in European cities.

stairways which often become unsanitary in ordinary city tenements. The recesses and angles in which the stairs are built are lined with white glazed tile, and at each turn of the stair is a seat set into the iron railing to provide a resting-place for children and invalids. The entire roof area is utilized for outdoor life, with loggias and big comfortable seats placed in various positions.

The European Apartment House Loggia

In some European cities many of the apartment houses are built with a loggia on each story within the roof projection (see Illustration No. 29). These are used during the summer months as open-air sitting rooms, and in many instances throughout the entire year as fresh-air sleeping apartments, with only canvas curtains for protection.

CHAPTER V

Temporary Fresh-air Porches for Country Use

Sheltered Positions for Porches

IN a small town or in the country, it will usually be found that a wooden porch is the most convenient way of providing fresh-air quarters. In selecting a situation for a sleeping or sitting-out porch, it is well to remember that it should be placed in a sheltered position, and the most important point is to find a spot protected from prevailing winds.

If a porch for winter use is to be built, it should, if possible, be placed on the south side of the house in order to receive the greatest amount of sunshine. In summer this position is usually very hot, and it will be found that in most climates an east or west exposure for a porch to be used during the entire year gives the best satisfaction.

Suggestions for Constructing Porches

A porch to be comfortable should be rather large, a good size being ten feet wide by ten feet long and seven feet or more in height from floor to ceiling. The floor should be laid with narrow spruce boards at a grade of

No. 30.—A temporary wooden porch supported on the roof of a front veranda, with the sides boarded up for use in winter weather.

one inch to five feet, using white lead and oil to fill in the cracks. The roof may be made with boards covered with tin or roofing paper, the end most exposed to the wind and rain protected by glass and sash, and the sides below the railing tightly boarded to prevent drafts from below. For a passageway to the porch cut a window down to the floor and put in a door three feet six inches wide, so that a

No. 31.—A well-finished porch placed in an angle of a house and supported on four by four inch timber posts.

No. 32.—A third-story temporary porch for use in moderate weather, supported on four by four inch timber posts.

three foot bed can be rolled from the interior of the house to the porch without difficulty. These porches can be supported from the ground on long four by four inch posts, or built on brackets bolted to the side of the house.

Many porches used both for sitting-out and sleeping purposes have been built on the roofs of first story extensions or verandas. When such means of support are utilized, the roofing over which the porch will rest need not be removed or damaged, as a permanent floor laid on

No. 33.—A very cheap porch supported by wooden braces and protected by a canvas awning.

No. 34.—A well-finished wooden porch, for use in moderate weather, protected by an angle of the house and supported by a four inch post.

joists can be built at a proper level by supporting the beams at the inner end on the wall of the house and at the outer end by the edge of the veranda.

Cost of Temporary Porches

An excellent temporary porch that will harmonize with the house to which it is to be added can be built for from

No. 35.—A temporary porch supported on the roof of a front veranda, showing method of protection with canvas curtains.

No. 36.—A temporary wooden porch placed for protection in an angle of the house and supported on four by four inch timber posts.

one hundred to two hundred dollars, the cost depending largely upon the manner in which it is finished.

A cheap, useful porch, large enough to receive a bed and effective for open-air sleeping, can be built for from fifteen to thirty dollars. A window can be used for the approach, but for convenience should be cut down to the floor and a small door put in below the window-sash.

The porches shown in this chapter were selected to illustrate the various methods of building cheap and temporary structures, and they can all be duplicated by a good carpenter after a study of the photographs.

Materials and Construction of Dr. Carey's Porch

The following is a description given by Dr. H. W. Carey of an economically constructed porch ten feet long by five feet wide, used in Troy by workingmen's families for open-air sleeping purposes. (See Illustrations Nos. 37 and 38.)

MATERIALS AND COST

Hardware:	
½ pound 20d wire nails	$ .03
2 pounds 10d wire nails	.10
2 pounds 8d wire nails	.10
4 hinges, with screws for same	.50
2 hooks and eyes, with extra eyes	.10
1 roll of tar paper and tacks for same	1.00
Lumber:	
1 piece, 2 inches by 6 inches by 20 feet, Bearing beams for supporting the floor	.60
1 piece, 2 inches by 4 inches by 12 feet, Plate to support the roof 5 pieces, 2 inches by 4 inches by 16 feet, Floor joists and studding 6 pieces, 2 inches by 4 inches by 14 feet, Studding	3.04
208 feet of North Carolina pine sheathing or shiplap in lengths of 16 feet	5.00
2 window-sashes, 3 feet wide by 4½ feet high	4.50
Carried forward	$14.97

No. 37.—One of the porches used by workingmen's families in Troy, N. Y., for open-air sleeping purposes. (*Courtesy of Dr. H. W. Carey.*)

	Brought forward	$14.97
Labor		4.00
Total		$18.97
The cost can be reduced by substituting canvas for window-sash. One and three-fourth yards of canvas two yards wide will cost $1.14. Subtracted from $4.50	$3.36	
Labor saved if built by owner	4.00	
		7.36
Minimum cost		$11.61

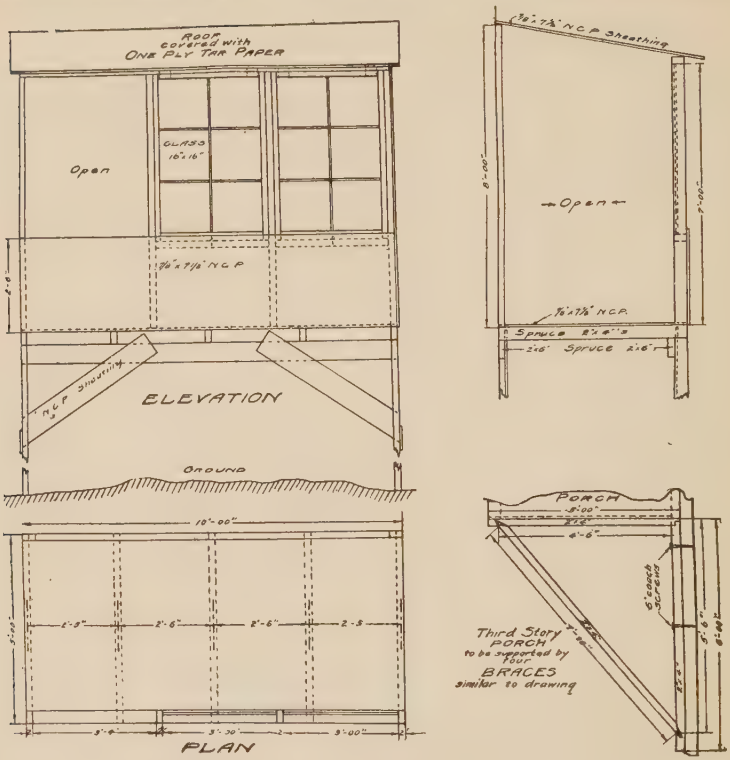
Either a carpenter should be asked to bid on the work and buy the materials at wholesale prices after seeing the estimate and plans, or the lumber and hardware purchased and a carpenter hired to put up the structure.

The floor, sides, and roof of the porch are made of North Carolina pine sheathing, or if this cannot be obtained, of shiplap. The frame, floor joists, and rafters are of two by four inch spruce timbers and the structure is supported on two by six inch bearing beams resting on brackets or on posts from the ground. The floor should come two feet below the level of the window through which the porch is entered.

If anyone desires to build this porch without hiring skilled labor, the directions given below should be followed, care being taken in cutting the lumber so as not to waste the material.

DIRECTIONS FOR CONSTRUCTION

The Floor Level.—Measure and mark a point two feet ten inches below the level of the window-sill through which



No. 38.—Drawings showing details of Dr. Carey's porch.

the porch will be entered and from this point measure the distance to the ground.

Supports.—Cut four two by four inch pieces for supports, two of sufficient length to reach from the ground to the mark below the window, and two six inches longer. This is done

in order that the floor will be level. Then nail the two shorter pieces to the house for back supports, ten feet apart, outside measurement. Then place the two remaining pieces five feet to the front of these, outside measurement, and stay in place with sheathing.

Floor Beams.—Cut the twenty foot piece of two by six inch bearing beam in half. Nail one piece across the tops of the back supports against the house and nail the other piece against the two front supports on the inside, and flush with their top.

Floor Joists.—Cut five, two by four inch pieces into five foot lengths for floor joists and nail them at equal distances across the two bearing beams just described.

The Floor.—Lay the floor with sheathing in ten foot lengths.

The Roof Supports.—Cut two, two by four inch pieces in eight foot lengths and fasten them to the house directly over the back supports. Then cut four, two by four inch pieces in seven foot lengths for the front pillars and one ten feet in length for the roof plate. Nail two of the seven foot pieces at right angles to the ten foot piece flush with its ends. At intervals of three feet inside measurement, fasten the two remaining seven foot pieces and raise this frame in place and nail the lower ends to the floor over the supporting posts.

Siding.—Board up tightly with sheathing the entire side of the porch most exposed to the wind, and also the opposite side and front to a height of two feet six inches.

Roof.—Cut sheathing boards into five feet eight inch lengths and lay the roof, covering it with tar paper.

Wind Shields.—Hang two window-sashes by hinges to the roof plate between the posts nearest the boarded-up end, so that they can be swung back and hooked up against the under side of the roof in order to be out of the way in clear weather. The head of the bed or couch should be placed at the enclosed end. If the porch is to be only a temporary structure, paint will not be necessary; if it is to be supported by brackets, four should be made as shown in the plans and fastened to the timbers of the house with six inch coach screws. Second-hand lumber and window-sash may be used, as these can be obtained for about twenty-five percent less than new material, and canvas curtains fastened to a roller may be substituted for the window-sash.

This porch is cheap enough to come within the means of the average workingman or charitable organization doing fresh-air work. It is easily constructed and can be attached to any story of a frame house, and the floor space, five by ten feet, gives ample room for a couch and reclining chair.

CHAPTER VI

Permanent Sleeping Porches and Loggias for Country Homes

EVERY country house should have a permanent sleeping porch in connection with one or more of the bedrooms, for sleeping in the open air is a simple method of preventing and curing disease. Ill health is one of the greatest handicaps human beings have to contend with, and no expedient for retaining one's health and strength should be neglected. Those who are afraid of open-air sleeping should try it in moderate weather, and if the experiments are made in well-protected porches or loggias, there is little doubt but that even a skeptic will soon become a devotee to the outdoor bedroom.

Situation and Protection

A permanent sleeping porch to be convenient should have an entrance from a bedroom, and when possible from a hall, for every outdoor sleeper should have during cold weather a warm apartment in connection with the open-air sleeping room. The same requirements regard-

ing protection and exposure are necessary for a permanent sleeping porch as those described in the last chapter for a temporary structure. An angle protected by two sides of the house is a very good position to choose if other considerations are favorable. When possible, it is an advantage to have on one floor two porches, one with a northern and the other with a southern exposure, arranged so that both can be reached easily from the same bedroom. This will provide a shelter for outdoor sleeping under varying weather conditions.

The Relation of the Porch to the House

Permanent porches should be designed in an artistic manner so as to harmonize with the building to which they are added. Usually, they should be constructed of the same material as that used in the main structure, and if possible, appear to be a part of the original design and not an afterthought. When the height of the porch is such as to bring its roof on or near the level of the roof of the main building, the cornice of the porch should be continuous with or correspond to that of the house. The roof of the porch should be of the same general design and the roofing material harmonize with that of the house. The interior of the porch should be finished in the same manner as the other verandas, unless it is to be an outdoor room or loggia rather than a porch. Then the walls should be sealed with narrow matched boards of good quality, such as selected Georgia pine, and treated with a liquid filler.

Treatment of Floors

There are various waterproof floorings which have been used with good success for open sleeping rooms, such as rubber tiling and composition cement, but an ordinary well-laid board floor is very satisfactory if covered for protection against the weather with battleship linoleum glued to the floor or a heavy grade of canvas stretched and laid in white lead and oil. This covering after it is laid should be painted or varnished with coach varnish.

Converting a Corner Room into a Loggia

Where a spare room can be used for the purpose, a simple and effective method of making a permanent open-air sleeping loggia is to remove the walls of the two outer sides of a corner room. The lower portion of these walls three feet high from the floor should be left standing to serve as a parapet, and a post or pillar placed at the corner and at other points if necessary, to support the roof. The ceiling and remaining walls should be protected against the weather by paint and coach varnish, or other waterproofing material.

The illustrations in this chapter have been selected to show various situations on houses which can be used for porches and loggias; the manner in which a portion of the main building will often act as a wind shield, or in some other way give partial protection, and the methods of constructing open-air apartments so that they will harmonize with the building to which they are added.

No. 39.—A well-built permanent porch supported by the roof of the first story veranda. Constructed of material and roofed in a manner to harmonize with the trimmings of the house.

A Fresh-air Room Protected by Glazed Sash

The fresh-air room shown in illustration No. 39 has been added to the rear of the second story of a large brick house. It has a southern exposure and is protected on the north by the wall of the house and on the west by a wing of the building, which extends back forty or fifty feet, forming a right angle with the main structure. The

room is protected on three sides by vertically sliding glazed sash which are counterbalanced by weights hung in the pillars supporting the roof. When the room is open, the sash are partially concealed in pockets above the frames. The apartment is constructed over the roof of the first story veranda, and is supported by the wall of the house and the posts of the lower porch. It was carefully designed to harmonize with the building, and appears to be a part of the original plan. The balustrade around the edge of the lower roof prevents persons on the ground from looking directly into the lower part of the open room. As it matches the rail on the first-story porch, it also adds to the trimming of the house, and does away with the unfinished appearance which some fresh-air rooms have when placed in this position.

An Example of an Inexpensive Sleeping Porch

The sleeping porch on the second story of the country residence shown in Illustration No. 40 was designed to correspond with the first story veranda, and so improves rather than injures the appearance of the house, although it was constructed in a most economical way. The floor and roof of the upper porch are supported by four by four inch dressed timber posts, placed six feet apart, and the space between them is divided into three sections by two by four inch timbers. The interior is protected by canvas curtains fastened to the roof plate, and arranged so as to be raised or lowered by ropes and pulleys that pass around rollers tacked to their lower edges. These curtains are

No. 40.—An inexpensive, permanent, second story sleeping porch, built to harmonize with the first story veranda.

made about six feet wide in order to fit in between the supporting posts, and rest against the smaller timbers. This arrangement helps materially in keeping the curtains firm during stormy weather, as both the rollers and canvas can be securely tied to the frames. The manner of using the short two by four inch pieces of timber for the railing should be noted, as they assist in producing an effect of

permanency, which is increased by continuing the cornice of the house around the edge of the porch roof.

A Permanent Open Room Over a Front Entrance

There are a number of interesting features to be noted in the attractive porch shown in Illustration No. 41. It has a substantial, permanent aspect, and although placed on the front of the house over the main entrance, it does not seem out of place, for it harmonizes with the architecture, and improves the appearance of the building. This attractive effect is largely obtained by using sup-

No. 41.—A permanent porch supported on the roof of the front veranda and designed to correspond with the original architecture of the house.

No. 42.—An open-air sitting room and sleeping porch designed to harmonize with the architecture of a country home. (*Courtesy of the "Ladies' Home Journal."*)

ports at the outer corners of the open room, built to resemble those carrying the roof of the first story veranda. These supports appear as a continuation of those on either side of the main entrance, and like them are finished with stained shingles and white trimming. The fresh-air room is supported on the roof of the lower veranda, and in order to obtain a sufficient height for its interior and lay the floor on the same level with that of the second story of the house, the roofing material was cut away. On either side the roof of the veranda remains in its original position, and is about eighteen inches higher than the floor

of the open room, at the point where it touches the wall of the main building. The roof and eaves of the porch are designed to correspond with those of the house, and the gutter under the eaves is a continuation of the one under the main roof. The trimming is also the same as that of the main building, except that the open room is protected by a balustrade with uprights painted white, instead of a parapet covered with stained shingles, as is used on the lower veranda.

An Open Sitting Room and Sleeping Porch on the End of a House

The building shown in Illustration No. 42 was designed on the lines of an old-fashioned New England farmhouse, and the open-air sitting room and sleeping porch built at one end are a harmonious addition and increase its attractiveness. Although quite distinct from the main building, the open rooms were carefully designed to conform with the style of architecture, and in constructing them the roof was made of the same material and given a corresponding pitch. Clapboards were used where boarding was necessary, and the style of the cornice follows that on the main structure. The parapet of the sleeping porch is made solid to prevent a draft close to the floor, and both rooms are protected on all sides by canvas curtains which fold upon themselves when they are drawn up by ropes run through pulleys. The treatment of the space between the supporting pillars below the floor of the second story to produce the appearance

No. 43.—A sleeping porch and open-air sitting room at the rear of a country residence, arranged to harmonize with the architecture.

of an arch, although a small matter, is effective, as it relieves the severity of all square corners.

Two Open Rooms in a Wing at the Rear of a House

The method of building the open-air sitting room and sleeping porch on the country residence shown in Illustration No. 43 is quite different from that shown in Illustration No. 42, although in both instances they are placed in very much the same relation to the building. Here the

open rooms are intended to have the appearance of loggias rather than that of porches. This manner of construction gives better weather protection to fresh-air rooms, and is often adopted when apartments of this kind are intended for use during the entire year. The space between the top of the parapet and the roof plate is arranged to be of such a height that either sliding sash or casement windows will fit them, and frames to which they can be attached are fitted in the opening. The lower room in this instance is screened with wire netting stretched upon frames that fit snugly into the casing, and are also arranged to hold casement windows during cold weather. The upper room is protected by canvas curtains. The cornice of the first story, which is a continuation of the eaves around the roof of the entry, and projects out above the openings of the sitting room, should be noted, as it produces an overhanging break in the walls, to which a gutter is attached to prevent rain water from dripping on to the window-sills below. The wing is built to conform with the architecture of the main building in order to give it an air of permanence, and not mar the appearance of the house.

An Example of a Loggia Placed in an Angle of a Building

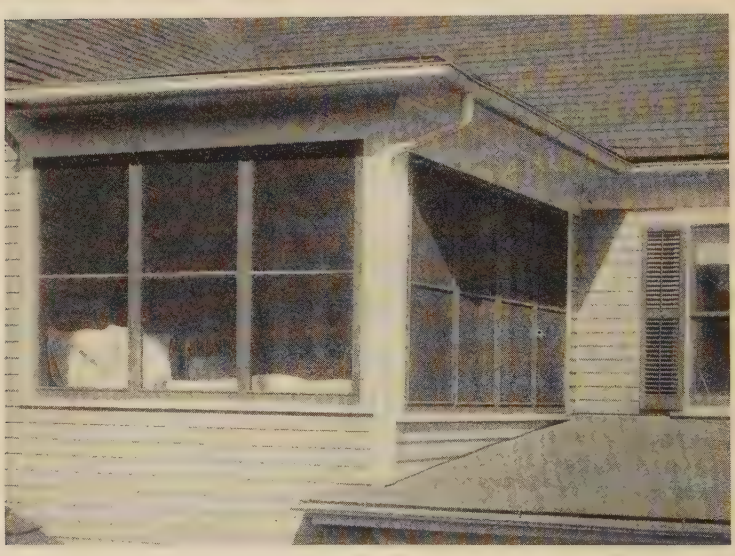
A loggia made by carrying out the main roof of the building over an angle of the walls of a house is shown in Illustration No. 44. The space formed by an abrupt change in the direction of the walls of a building is often

No. 44.—A permanent second story sleeping loggia covered by the main roof of the building, and supported by posts of the first story veranda.

left vacant, but in this instance the ground area is occupied by the entrance porch, and the floor of the loggia is supported by the walls of the house and the posts that carry the roof plate of the veranda. A portion of the roofing over the lower veranda was removed to furnish a level space for the floor, and a parapet about thirty inches high was built to enclose the two outer sides of the apartment. Frames divide the space between the coping of the parapet and the roof plate, to which casement windows can be hung or screens fitted. Although this open apartment was not constructed by cutting out the two side walls of a corner room, it has very much the same appearance from the exterior of the house as a loggia made in that manner. It is, however, an addition, and its two inner walls are a part of the main walls of the building, which are finished with clapboards.

An Example of an Enclosed Porch in an Angle of a Building

The open-air sleeping room shown in Illustration No. 45 is a good example of the use of a location which is protected by an angle in the walls of a building. The space used is a corner formed by a wing extending from the main structure, and although the porch is not situated within the walls, nor covered by the main roof of the house, its position is more sheltered than the loggia shown in Illustration No. 44. It is covered by an extension roof, as it was impossible to carry the main roof with the same pitch beyond the walls of the house, and construct a comfortable



No. 45.—An open-air sleeping room set in an angle of the house and covered by an extension of the main roof of the building.

open-air room on the second story. Although both its walls and roof are purely additions to the building, it harmonizes well with the architecture, and appears a part of the main structure. This effect is due largely to the continuation of the cornice of the house around the roof of the porch.

The Roof of the Summer Kitchen Used as a Site for a Sleeping Porch

Many country houses are designed with a wing extending out to the rear, which is used as a storeroom or

No. 46.—A permanent sleeping porch on a suburban residence, built over the roof of the kitchen extension.

No. 47.—A permanent sleeping porch at the rear of a country house, designed to harmonize with the original structure.

summer kitchen. The roof of this addition is a very convenient location for a fresh-air room, and two examples of sleeping porches placed in this position are shown in Illustrations Nos. 46 and 47. In many instances the kitchen is covered with a roof of the lean-to type, having a fall of about eighteen inches from the house wall to the outer edge. The most important point to be considered in using this position is the possibility of bringing the floor of the porch on a level with the floor of the second story of the house, without incurring the expense of cutting out the roof below. The floor of the second story in the house shown in the first illustration was high enough to allow the laying of the porch floor without interfering with the lower roofing, and a few clapboards were used to fill in the space between them. Both these porches were constructed so as to be as inconspicuous as possible, and the material and finish used correspond with those on the main building.

Fresh-air Rooms on a Seashore Home

The permanent sitting room and sleeping porch built on the end of the building shown in Illustration No. 48 greatly add to the attractiveness of this house. It should be noted that they were designed so as to appear a portion of the main building, being finished in the same manner and with the same material as the other parts of the structure. Both the large sitting room on the first floor, and the sleeping apartments on the second, are protected by Venetian blinds which are very convenient and

No. 48.—A seashore home with a permanent open-air sitting room and sleeping porch, shielded by Venetian blinds.

suitable for summer use. The porches have an eastern exposure, and the half awnings are used to prevent the direct sun rays from entering the sleeping apartment in the early morning.

CHAPTER VII

Methods of Protecting and Screening Porches

Protection for Cold Weather

IN order to sleep with comfort in the open air on a porch or loggia during the winter months, besides the necessary clothing, which will be described later, the sleeper should be protected from the wind and other weather conditions. However, one sleeps out-of-doors because of a desire to breathe fresh pure air, and this object must not be thwarted by over-protecting the sleeping apartment. Circulation of the air is just as much needed in open-air structures as in enclosed habitations. Therefore, in arranging for weather protection, apertures through which cross ventilation can be obtained are necessary.

Glass and Sash

A most desirable manner of protecting porches is by the use of frames holding sash and glass. If economy is not necessary, the entire porch may be enclosed with this material, as is shown in Illustration No. 39. All the

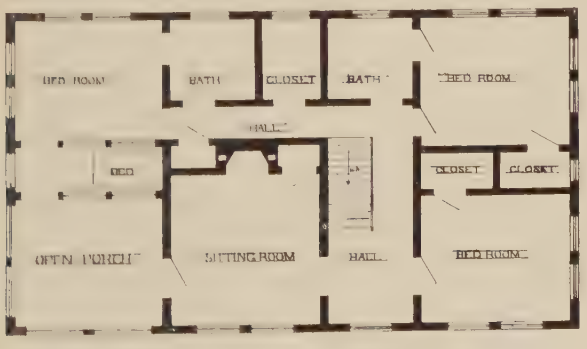
No. 49.—Dr. Paquin's "In and Out Sleeper" for protecting the outdoor sleeper from sudden storms. The bed is placed in an alcove between the porch and a warm room, and is enclosed on both sides by movable windows or doors.

frames should then be arranged so that the space which they fill can be entirely thrown open. Sliding sash, which can be folded down into a pocket below the porch railing or up into boxes concealed in the roof or walls, are convenient for the purpose. They should be counterbalanced in the same way as an ordinary window-sash, with cords and weights, so that they may be adjusted without great effort. Square porch pillars with a hollow interior to provide a space in which to conceal the counterweights should be used, and the sash held in place and

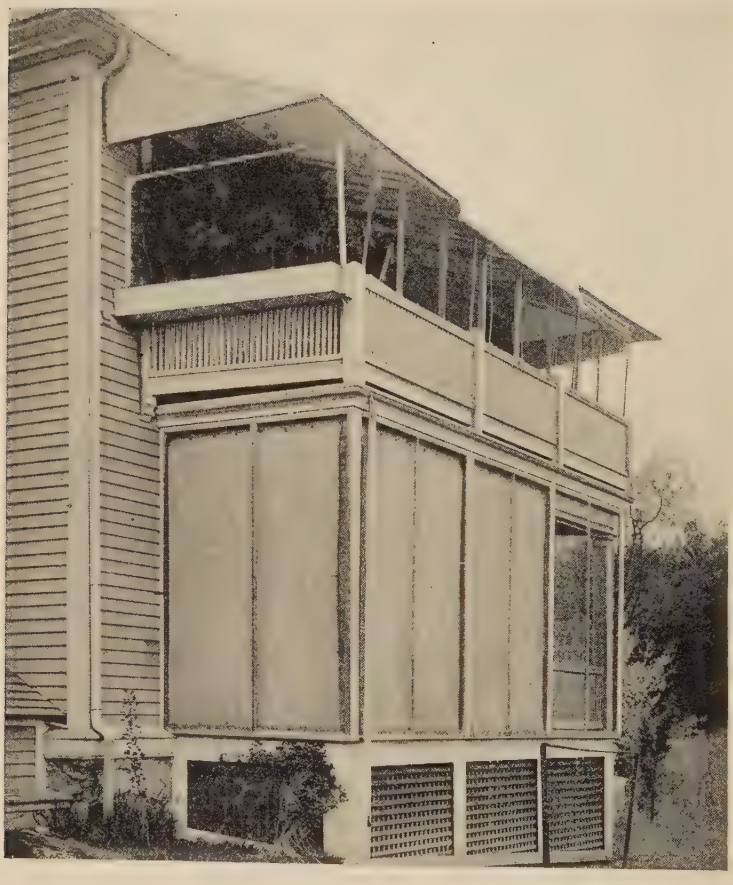
guided either by a wooden casing or a brass track. If a track is used, wheels to fit it should be inserted into the sides of the sliding frame.

Dr. Paquin's Alcove

Dr. Paquin of Asheville has described the construction of what he calls an "In and Out Sleeper" (see Illustrations Nos. 49 and 50), which he claims is a good method of protecting persons sleeping on porches or loggias from storms which suddenly arise. It consists of an alcove on the back of a porch, built of glass and sash in frames, and arranged so that the rear can be opened directly into a room and the front on to the porch. The bed is placed in the alcove, and the person intending to sleep in the open air closes the outer windows and undresses in a warm room, then upon entering the bed closes the inner windows and



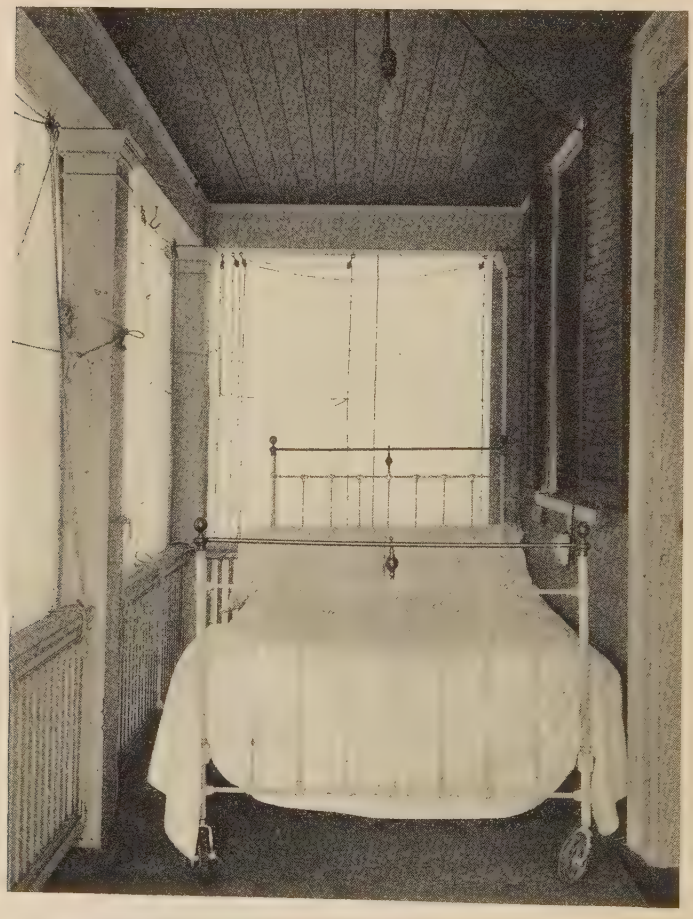
No. 50.—The floor plan of Dr. Paquin's "In and Out Sleeper," showing arrangement for shutting off the bed from the room or porch.



No. 51.—A sleeping porch protected by canvas curtains hung on the inside of wire screens.

opens the outer ones, thus placing the bed in the open air without moving it. In the morning the arrangement of the windows can be reversed, thus returning the bed to a warm dressing room. If a sudden storm comes up in the night, the bed can be protected at once by pulling down the outside sash and pushing up the inside one. The construction of this device is simple, as can be seen on the floor plan, and it is said to work well at the Indiana State Hospital, where it has been adopted.

No. 52.—The interior of a porch enclosed by canvas curtains fastened at the bottom to shade rollers. The sides of the curtains are buckled to the posts.



No. 53.—The interior of a porch showing a method of manipulating canvas curtains by ropes and pulleys.

Protection for Moderately Cold Weather

If a porch is fairly deep and sheltered on two sides by an angle of the house, sufficient protection for moderately cold weather can usually be obtained by canvas curtains. Where the porch stands out from the house, one or both sides should be provided with sash and glass and the front with a canvas curtain.

Canvas Curtains

These curtains are usually made of heavy duck and can be arranged and controlled in various ways, as shown in Illustrations Nos. 51 to 56. In putting them up it should be remembered that they are intended to keep out

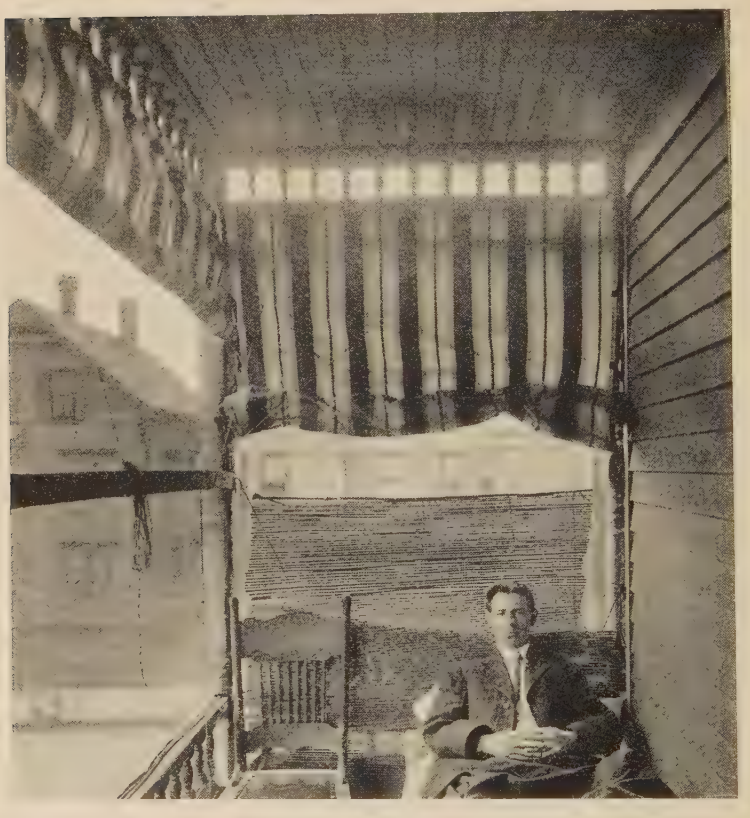
No. 54.—How to protect a bed during stormy weather with a heavy canvas blanket when the porch has no adequate protection.

No. 55.—A porch covered and shielded by canvas curtains supported on tubular iron rods. These are raised or lowered by means of ropes and pulleys.

strong winds, rain, and snow, and so must be firmly fixed when in place for protection. A simple way of arranging them is to bind the edges of the canvas after cutting it into the required size for the curtain, then tack the upper edge of the curtain to the inside of the roof plate, and reinforce the tacks by a piece of lath or narrow strip of board nailed over the canvas and row of tacks. To the bottom of the curtain should be attached a wooden roller about one inch in diameter. The curtain can then be rolled up out of the way by ropes run through pulleys attached to the roof plate. Screw-eyes should be inserted into the floor below the roller and at intervals in the posts at the sides of the curtain, so that the canvas can be tied tightly with tapes during windy weather. Carriage curtain tongues and buckles or buttons and eyelets may be used instead of tape, as is shown in Illustration No. 52.

Protection for Moderate and Warm Weather

For moderate and warm weather, porch protection is needed against occasional winds, rain, and sunlight, and to prevent the porch from being overlooked. For this purpose light duck or denim curtains, Venetian blinds, or Japanese matting curtains are generally used. Cloth curtains of various textures can be conveniently manipulated if hung on heavy spring shade rollers. The rollers may be attached to either the top or bottom of the opening which is to be protected. When rolled from the bottom, the curtain is drawn up by a cord passed through a pulley attached to the roof plate, as is shown in Illus-



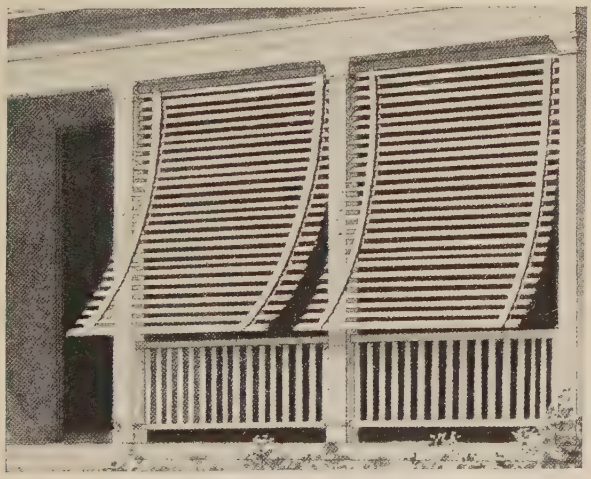
No. 56.—Protecting a sleeping porch with canvas. A wooden roller is tacked to the bottom of the curtain, which can be raised by cords passing through pulleys attached at the top.

tration No. 52. This is a very convenient arrangement, as the shade can then be drawn up in a position that will screen the sleeper without shutting out the air, and in the

event of a storm at night or to shut out the light in the morning it can be raised to its full height from the bed.

Venetian Blinds and Japanese Matting

Venetian blinds are made of wooden slats hung on heavy tapes and raised or lowered by operating an overhead roller (see Illustrations Nos. 12, 48, and 57). They can be pulled down to any position and the slats arranged at any angle desired. These blinds and Japanese matting give efficient protection and are very convenient for the summer months and for tropical countries. The Japanese matting is fixed in position and controlled in the same



No. 57.—Venetian blinds are inexpensive and make a good shield for a sleeping porch in hot weather. (*Courtesy of the J. G. Wilson Mfg. Co.*)

No. 58.—Japanese curtains are a good protection for a sleeping porch in summer. A wooden roller should be attached to the bottom.

manner as a canvas curtain, with a wooden roller attached to the bottom, as shown in Illustration No. 58.

Cloth Screens

For moderate weather protection and to prevent annoyance from being overlooked, a cloth screen attached to a wooden frame made like a folding Japanese leaf screen is sometimes used. A home-made cloth screen which can easily be made at a small expense is described by Mr. A. C. Clauson. The materials required are nine pieces of spruce slats two inches wide by seven-eighths of an inch thick, a few ten-penny nails, some half-inch screws, twelve small shelf brackets three by four inches long, six two-inch hinges, some unbleached muslin, tacks, and oil stain. The spruce slats should be dressed on all sides and used to make the frame for the three leaves of the screen, each leaf being two feet wide by five feet six inches high. The frame is screwed together and held rigid by a bracket in each corner. The lower bars of the frame should be about twelve inches above the floor and the upper bars a few inches from the top of the screen. The leaves are hinged together and covered with muslin. Gate hooks should be screwed into the top of the frame and screw-eyes placed in different places at the top of the porch so that the screen can be hung up in any desired position.

Protection Against Insects

In tropical countries, and during the summer months in most northern latitudes, protection against insects is

No. 59.—A simple means of screening a bed over a square frame. Better protection can be obtained if the netting is hung on the inside of the framework.

necessary for the comfort and health of those who live and sleep in the open air. In screening beds and rooms care should be taken to select perfect netting, as gnats and mosquitoes are often very persevering in their search for openings through which to reach the person protected by such material.

Cloth Netting

When using cloth netting for a canopy over a bed it should be made long enough to be easily tucked under the mattress on every side, and hung on the inside of the poles of the frame which supports it, for when allowed to hang down to the floor or when hung over the outside of poles, it usually falls in folds through which insects may gain entrance. Canopies should be made without side openings and should be entered by slightly raising the netting and passing through underneath so as to exclude mosquitoes hovering near the body.

Insects on the outside of a netting may reach the body when pressed against the inside of the screen. It is therefore a good plan to use a wide bed for open-air sleeping in localities where disease carrying mosquitoes abound; or, when screening a small bed, to sew a soft cloth loosely around the netting where the body rests against it. In order to obtain the best service in screening a bed with cloth netting:

1. Choose a light colored netting, preferably white, as it is very difficult on colored materials to detect insects which enter the screen.

No. 60.—Screening a bed with mosquito netting and open-mesh cloth, in tropical countries.

2. Use a large mesh netting about eighteen threads to an inch, as it will exclude troublesome insects except sand flies, and a closely woven material shuts out the air.

3. Use a coarsely woven cheesecloth or scrim for protection against sand flies.

4. When putting up the canopy stretch it tightly in every direction so as to allow air to pass freely; a loosely hung net excludes the air.

5. Do not make a circular canopy; a netting should have square corners in order to stretch it.

In camps and when a quick temporary method of screening a bed is desired, barrel hoops or those sold as toys for children to roll can be used for supporting the netting.

No. 61.—A simple way to screen a bed by using a barrel hoop or a green bough for support. This should not be used to guard against disease-bearing insects, as it does not give adequate protection.

No. 62.—A simple and satisfactory manner of screening porches of country residences with wire netting against insects.

Cut the hoops through in one place and attach the ends, as shown in Illustration No. 61, one to each side of the head and foot boards of the bed. Long, slender limbs of trees will serve the same purpose. Over this support the netting can be thrown and tied on the outside of both the head and foot boards. Cotton netting is strengthened and given fire and water resisting properties by painting it with a solution made of equal parts of silicate of potassium and water. Several coats of the solution should be applied, after the netting has been stretched on a frame, without allowing it to dry between the applications.

Wire Screens

Wire netting is much more durable than cloth and should be used in screening porches and open-air rooms in localities where disease-bearing mosquitoes are found. In order to obtain thorough protection from this species of insect it is often necessary to build a complete wire gauze room within the open-air shelter. A frame made of upright wooden supports should be placed in the four corners, fixed securely in place, and connected by cross-pieces, and

No. 63.—A tent screened with wire netting which completely lines the under side of the canvas.

No. 64.—Showing a method of screening porches with wire netting in tropical countries.

to this frame wire gauze should be tacked, making a complete inner chamber. Care should be taken to make the corners tight and to leave no apertures on the line where the gauze is tacked to the floor.

CHAPTER VIII

Tents and Tent Houses

TENTS are frequently used for open-air living and sleeping accommodations and are found to be fairly satisfactory in warm dry climates, but they do not make a suitable permanent shelter for this purpose in northern countries. They are not particularly comfortable, but are cheap, easily transported and erected, and therefore convenient for making temporary quarters. However, they are not to be recommended for those who can afford to construct open buildings with more durable material. Ordinary tents hold odors, and in warm weather are extremely hot and uncomfortable during the middle of the day. Often they are very hard to ventilate, for a strong draft is produced when the flaps are open. There is no truth in the statement that they can be ventilated through the meshes of the cloth, as canvas is almost impenetrable to currents of air.

Tents on City Roofs

Tents have been erected upon the roofs of city buildings (see Illustrations Nos. 65 to 68), but they are not to be

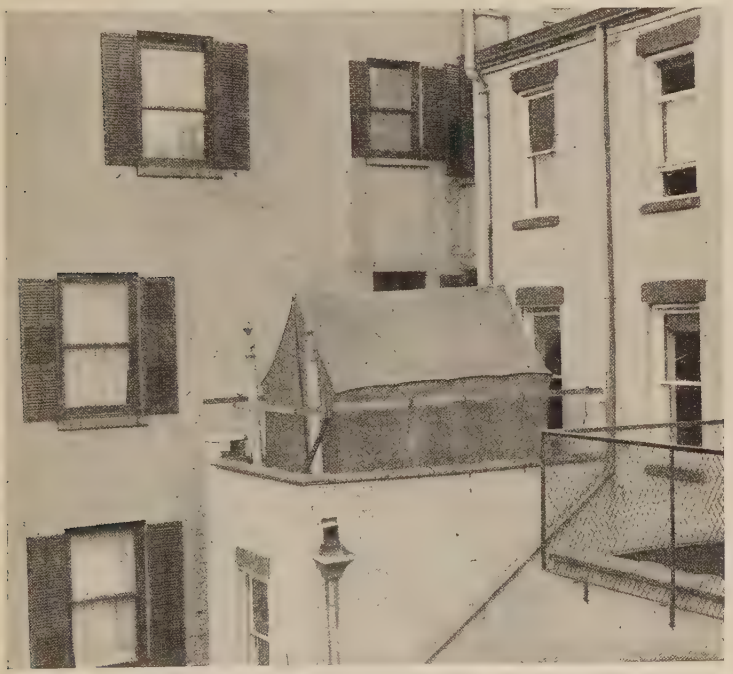
No. 65.—A tent on the roof of the rear extension of a city dwelling, raised over a rigid and well anchored frame. The lattice work base protects the interior but allows fresh air to enter. (*Courtesy of Dr. W. P. Northrup.*)

recommended for such positions unless they can be placed in the shelter of a strong wind-break. When erected upon the roofs of high buildings, they should be protected on two sides by walls, or by other portions of the structure upon which they are placed, that run up as high as the top of the

ridge-pole of the tent, and they should be raised over and attached to a timber frame that is well anchored.

The Cost of Tents

A small tent of good material can be purchased for about fifteen dollars, and a strong two by four inch timber



No. 66.—An ordinary tent pitched on the roof of a rear extension, and held by guy ropes attached to two by four inch timbers. (*Courtesy of Dr. W. P. Northrup.*)

No. 67.—A lean-to tent shelter which can be easily arranged on the roof of a city dwelling. (*Courtesy of Mr. F. D. Greene.*)

frame can be made for eight or ten dollars additional (see Illustration No. 74). Metal frames for tents can be obtained ready to be bolted together at a cost of from thirty to fifty dollars, according to the size.

Many modifications of the ordinary tent have been made for the purpose of obtaining a well ventilated canvas shelter. The special tents and ventilating devices described and illustrated in this chapter were designed to meet the need for a cheap, comfortable, and sanitary tent.

The Fisher Tent

This is a square tent twelve feet in both directions and eight feet high from the under side of the sill to the top of the roof plate (see Illustration No. 69). It is supported by posts at the four corners, and on each side between the pillars, instead of a tent wall are sliding doors of canvas. Each door occupies only slightly more than one-half the space and may be moved to any position within that space, like sliding doors in front of pantry shelves. The eight doors on the four sides may be arranged in any desired position to secure ventilation or sunlight. The widest opening of the tent is obtained in several ways, one of

No. 68.—A cheap but rigid tent house on the gravel roof of a city apartment building. (*Courtesy of Dr. Joseph H. Pratt.*)

No. 69.—A tent with all four sides made of sliding canvas doors. (*Designed by Dr. Irving Fisher.*)

which is by thrusting four of the doors against one post and the other four against the diagonally opposite post, leaving the other two corners entirely open. A proper adjustment of the doors will give good ventilation and at the same time protection from the wind. The roof has a

slight slope with a small opening in the centre, covered with a rain umbrella which may be brought down snugly when the interior is to be heated.

This tent is arranged so that it can be readily taken apart and set up with little trouble. The following specifications are given in order that a fairly substantial structure may be erected if it is to be located in a permanent position.

The Floor.—The sills are of three by four inch timber, each piece cut seven and one-half inches shorter than twelve feet, to give room for the posts at each corner. Pieces of two by four inch timber are dove-tailed across the corners and held in place with screws so that the posts may be bolted to them. These can be easily removed when the tent is taken apart. Two beams of two by four inch timber placed together support the floor under the centre of the tent and the sills are cut between the beams so that the framework of the floor is in two halves. The floor joists are of two by four inch timber placed about two feet apart between the beams and sills. When the tent is set up, the two centre beams are bolted together, in order to hold the floor in one piece. The flooring is of one by six inch pine boards, planed and matched. They are cut off in line with the inside of the posts and the ends carried by a one and one-half by two inch timber nailed on the inside of the sill. One or two boards in the middle of the floor are held in place by screws so that they can be easily raised to remove the bolts holding the centre beams together.

The Frame.—The posts are of four by four inch timber, seven feet eleven inches long, cut out one-fourth inch at the

bottom, so that they have a bearing on the sill. The top of the posts are cut in a similar manner to hold the plates. These are of three by four inch timber halved at the corners, and held together by a piece of timber dove-tailed and bolted through the post as in the sills. The frame is held rigid by an angle iron placed at the top and bottom of each corner. Both arms of these braces are eighteen inches long, two inches wide, and three-eighths of an inch thick, and they are placed on the outside of the plate or sill and held with screws.

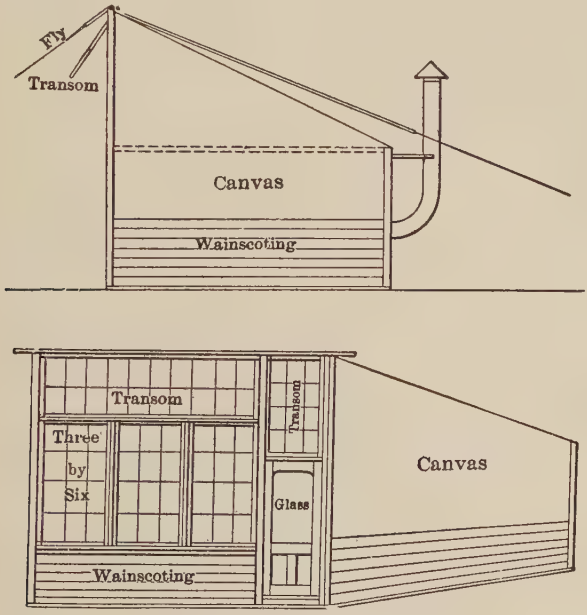
The Roof.—The roof is made in four sections, held in place at the corners by hip rafters bolted together, and the eaves project twelve inches beyond the side of the tent. A small frame of two by five inch timber mitred together at the corners surrounds an opening twelve inches square in the centre of the roof. The hip rafters are of one and one-half by four inch timber and the inner rafters are of two by three inch timber. The sheathing is of one by six inch pine boards planed, matched, and covered with Ruberoid roofing paper or shingles. The rafters should be fastened to the plate and the centre frame so that each side of the roof is a separate section, and after they are in place the hip rafters are bolted together and the frame around the opening fastened at each corner with an angle iron. The hood over the opening projects twelve inches beyond the frame, is raised four inches above the roof, and has the same pitch. On the under side hangs a door which may be opened or closed by a cord run through a pulley.

The Sides.—On each side of the tent are two sliding

door frames of one by three inch spruce, timber covered on both sides with eight-ounce canvas held to the frames by galvanized iron tacks. Ball-bearing sheaves are inserted in the bottom of the doors and run on a track fastened to the sill.

The Lapham Lean-to Tent

This tent is twelve feet wide by fourteen feet deep, and has a canvas roof and sides with a glass front (see Illus-



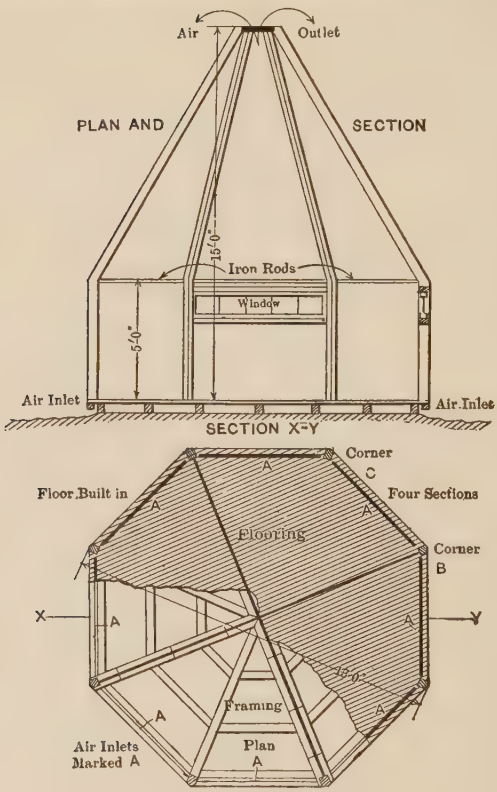
No. 70.—The Lapham tent consists of a lean-to frame, a canvas cover, and a glass front, and can be used as a sun parlor.

No. 71.—The Gardner tent is a modification of the Indian tepee, and has an open space at the bottom of the sides and a hole at the top for ventilation.

tration No. 70). It is intended for use as a sun parlor during the winter months, and should be placed so that the front has a southern exposure. The floor rests on piers one foot above the ground, and is made of one inch floor boards laid double, with a two inch air space between the layers. There is a wooden base around the walls five feet high, and with the exception of this support and a portion of the door, the entire front is made of glass and sash. The roof is of canvas reinforced by a fly held in place by guy ropes, and has a steep fall from a twelve foot height in front to five feet in the rear in order to prevent leakage over the flat surface.

The Gardner Tent

This tent is a modification of the Indian tepee, conical in shape, with a hole at the top and an open space at the bottom between the floor and the sides (see Illustrations Nos. 71 and 72). The arrangement of the openings is intended to act like a fireplace and produce a constant upward current of air through the interior. The floor is in six sections and can be bolted together. It is made of one by four inch tongued and grooved boards, supported eight inches above the ground on two by four inch joists. Around the edge of the floor is a wainscoting of narrow floor boards four feet high. There is no centre pole, as the tent is supported by an eight-sided wooden frame. The roof and sides are of twelve-ounce khaki colored duck, and the point where the slope toward the centre begins is six feet above the floor. The lower edge of the canvas walls



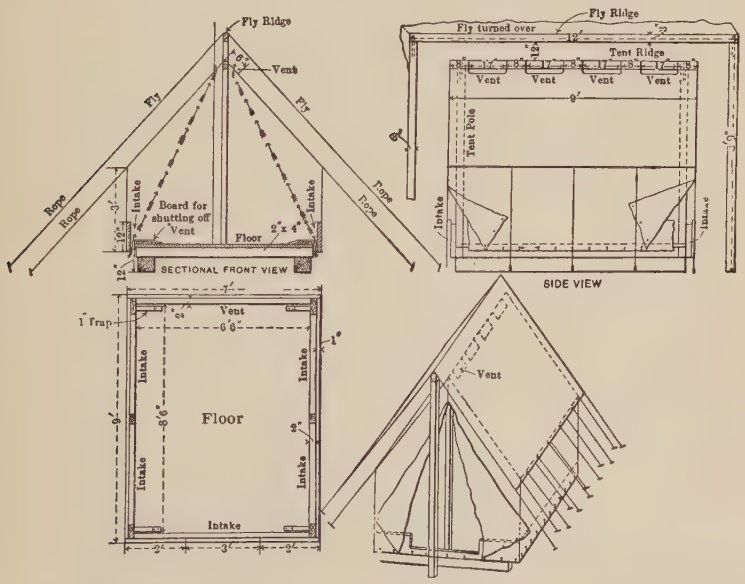
No. 72.—Drawings of the Gardner tent, showing the method of building the floor and arrangement for ventilation.

are fastened several inches below the floor and one inch out from the wainscoting on all sides. This leaves an aperture through which a gradual inflow of air is obtained

without causing a draft. The opening in the centre of the roof is one foot in diameter and is covered with a zinc cap which can be raised or lowered by ropes running through pulleys.

The Ulrich Tent

The Ulrich tent (see Illustration No. 73) was designed as a shelter for one person, and is ten feet wide by twelve feet deep. The floor is of ordinary planed boards, laid



No. 73.—These plans show an arrangement for ventilating an ordinary tent. (*Courtesy of Dr. H. Ulrich.*)

No. 74. An ordinary tent with a ventilator above the door, pitched over a well built board floor and rigid frame. (*Courtesy of the Department of Health, New York City.*)

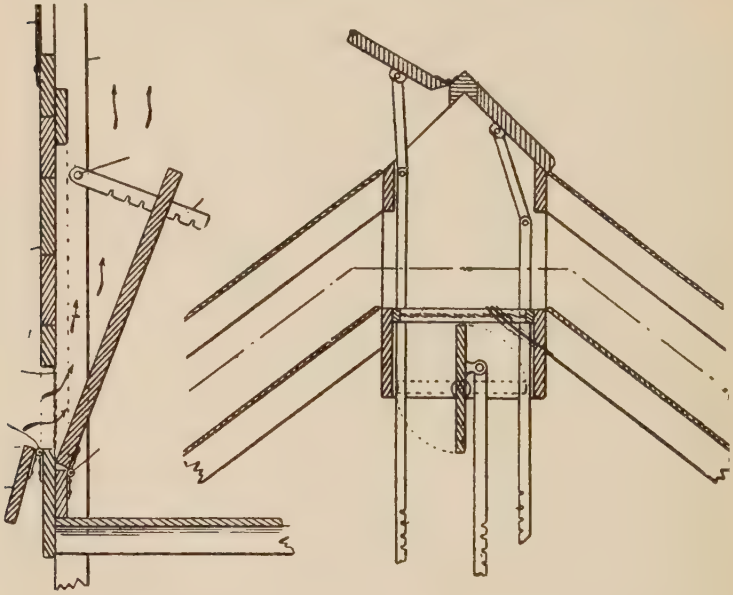
over two by four inch joists raised one foot above the ground. A base of one inch boards twelve inches high is built around the edge of and at right angles to the floor, with a two inch open space intended as an intake for fresh air between it and the outer ends of the floor boards. The base or wainscoting is rigidly fastened in position, and extends two inches below the under surface of the floor in order to produce a wind-break and prevent direct drafts. The tent is raised in the ordinary way over the floor, and

the canvas tent walls are attached low down on the outside of the upright base. Any cheap tent can be arranged in this manner.

The Tucker Tent

This tent is made in two sizes, eight feet wide by ten feet long, and twelve feet wide by fourteen feet long (see Illustrations Nos. 75 and 76). It consists of a wooden floor, a high wooden base, and canvas sides, roof, and fly of

No. 75.—The Tucker tent has a high wooden base around the sides and is well ventilated.



AIR INLET NEAR FLOOR. ROOF VENTILATORS.

No. 76.—Drawings describing the manner of ventilating the Tucker tent.

twelve-ounce army duck. The fly extends one foot over the edge, and ten inches above and parallel to the roof of the tent, allowing a free circulation of air between the two layers. The canvas above the base in the front is attached to awning frames so that it may be raised at various angles or removed entirely for the free entrance of sunlight. The tent is ventilated by an inlet for air in the wainscoting near the floor, which may be opened or closed, and a ventilator in the centre of the roof.

TENT HOUSES

Tent houses are safer and more convenient than tents, as they are usually made with walls sufficiently high to allow space for standing upright at any point in the structure, and are laid over frames of either timbers or metal constructed rigidly enough to support the canvas against heavy wind strains (see Illustration No. 82).

The Biggs Tent House

This shelter may be used instead of a tent at a permanent camp, and can be made comfortable for eight or nine months of the year. It consists of a wooden floor, a base supporting window frames, fitted with glass and sash on all sides except the rear, and a double canvas roof (see Illustrations Nos. 77 and 78). The main room is fourteen feet wide by sixteen feet deep and rests on eight stone piers. The sills are six by eight inch timbers and the floor beams two by six inch pieces placed sixteen inches from centre to centre, reinforced by a girder placed under the centre of the house lengthwise. The outside of the sills is cased, and the floor laid with seven-eighths inch boards three inches wide. The main posts are four by four inch timbers set on the top of the floor, and the filling studs are two by four inch timbers set flat, twenty inches apart. The main plates and cross beams are four by six inch, the ridge-pole two by twelve inch, and the rafters are two by six inch timbers. The horizontal pieces of the outhangers are four by four inches, and the brace and tie members two by

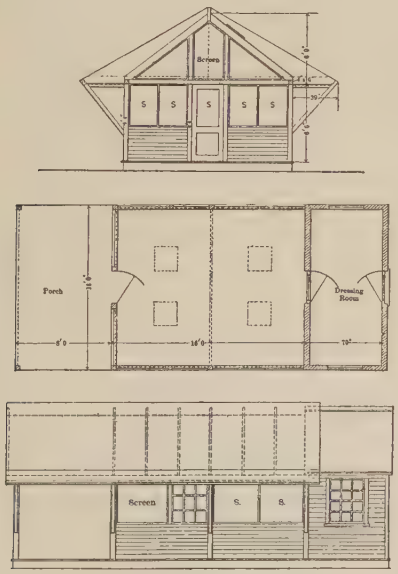
No. 77.—A good shelter for a permanent camp which can be made comfortable during eight or nine months of the year. (*Designed by Dr. Hermann M. Biggs.*)

four inches, all strongly framed together. The window and door frames are simple jambs and casings, nailed direct to the studs. The lower sides are enclosed with novelty siding and the roof and fly are of heavy canvas.

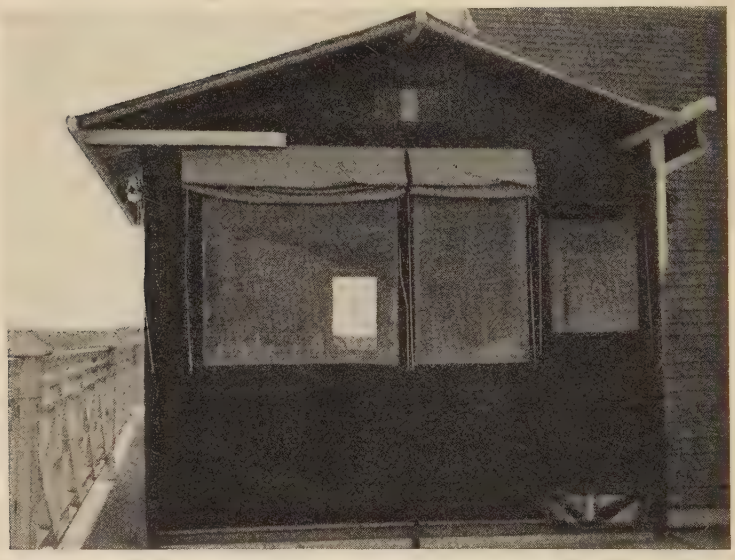
The entire framework is left rough as it comes from the saw, and the whole stained a moss green. In the rear of the tent house is a small dressing room, fourteen feet wide by seven feet deep, built with a frame of two by four timbers tightly boarded and covered with tar paper.

The Kenyon Tent House

This tent house can be purchased ready for use in various sizes, and is made of heavy brown duck supported



No. 78.—Drawings of the Biggs tent house, giving some details of its construction.



No. 79.—The Kenyon tent house is made of a heavy brown duck supported by a take-down sectional wooden frame.

on a wooden frame of Georgia pine (see Illustration No. 79). The frame is made in take-down sections, with a special joint so that the house can be put together without the use of nails or screws. The ceilings are of brown burlap, with an air space between them and the canvas roof. The floor is made in sections of light weight pine boards, two and one-half inches wide, smoothed and varnished. The sides are lined with canvas, and there is a two inch air space between the layers. The ventilation

is good, and the doors and windows are large and protected by screens.

The Metal Screen Tent House

This shelter consists of a steel frame, with the space between the framework filled with heavy wire insect screening, and an outer covering of extra heavy canvas (see Illustrations Nos. 80, 81, 82). The canvas walls are in sections, and can be removed from the sides when desired, in order that the interior which is thoroughly protected

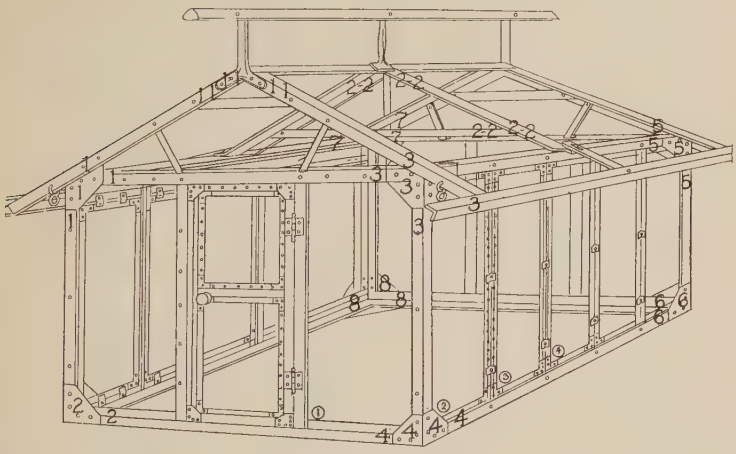
No. 80.—The Metal Screen tent house with the canvas sides in position is well protected from the weather.

No. 81.—The Metal Screen tent house with the canvas sides removed is a screened shelter open to the air on every side.

against insects may be open to the air. Each piece of the frame is numbered, and can be easily placed in position or taken down and folded for transportation. The frames are well made and are said to last for years if carefully handled. The floor is of one-inch matched boards, laid four inches above the ground on two by four inch timbers. The roof is of double thickness, and the upper layer or fly is raised eighteen inches by a projection from the iron framework of the house.

The U. S. M. H. Tent House

This building is twelve by fourteen feet inside measurements and will accommodate two persons (see Illustrations Nos. 83 and 84). It may be readily screened for the summer months and opened on all four sides, allowing free ventilation without disagreeable drafts. The roof, floor, and base are of wood and the remaining portions of the wall are canvas stretched on frames. The plates, rafters, ridge-pole, and fly poles have rounded edges. The sides are boarded with six inch matched boards and all upright pieces are nailed to joists. The distance between the cap and the plate is regulated by the height of the side



No. 82.—A frame of angle iron supports the Metal Screen tent house. Each section is numbered, bolted together, and filled with wire netting.

No. 83.—A cheap, substantial shelter for the summer months which can be opened and screened on all sides, in use at the U. S. Marine Hospital.

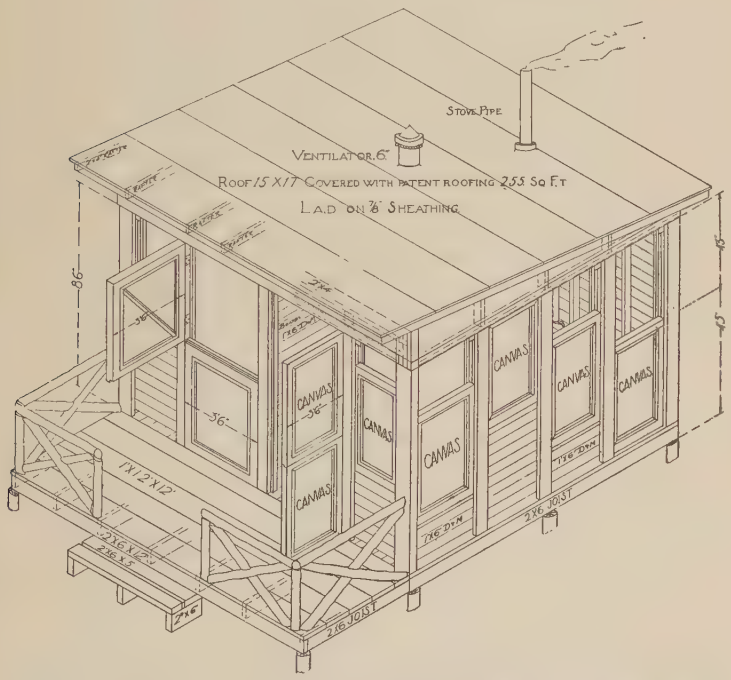
wall of the house and should be as great as practicable. The door can be battened or made of canvas, either one-half the length or the full height as desired.

A list of the material used in the construction is given below, and will cost about one hundred dollars. This,

together with the drawing and photograph, should make the construction a simple matter for any carpenter.

Lumber:

3	pieces	for	Sills	4	x	4	inches	14 feet long
7	"	"	Joists	2	x	6	"	12 " "
2	"	"	Centre Poles	2	x	4	"	12 " "
1	"	"	Ridge-pole	2	x	4	"	10 " "



No. 84.—A drawing of the U. S. Marine Hospital tent house showing some details of construction.

Lumber:

6	pieces	for	Rafters	2	x	4	inches	10	feet long
1	"	"	Fly Pole	2	x	4	"	10	" "
2	"	"	Plates	2	x	4	"	14	" "
2	"	"	Plates	2	x	4	"	12	" "
2	"	"	Caps	2	x	4	"	14	" "
2	"	"	Caps	2	x	4	"	12	" "
4	"	"	Uprights	2	x	4	"	16	" "
1	"	"	Uprights	2	x	4	"	8	" "
8	"	"	Stanchions	2	x	4	"	10	" "
4	"	"	Guy Rails	2	x	4	"	16	" "
4	"	"	Braces	2	x	4	"	12	" "
1	"	"	Shelves	1	x	12	"	12	" "
2	"	"	Shelves	1	x	12	"	14	" "
2	"	"	Braces	2	x	4	"	8	" "
3	"	"	Steps	2	x	4	"	8	" "
30	"	"	Flooring	1	x	6	"	14	" "
20	"	"	Siding	1	x	6	"	14	" "
20	"	"	Siding	1	x	6	"	12	" "
7	"	"	Frames	1	x	2	"	14	" "

One door
One sash
Canvas.

Hardware:

Thirty-six one-inch number seven screws
Two hooks and eyes
One window catch
Fifteen pounds eight-penny nails
Twelve pounds twenty-penny nails
One eight-inch ventilator
One roll of patent roofing paper

CHAPTER IX

Open-air Bungalows and Cottages

FOR many reasons it is often necessary to build a small cottage or bungalow in order that one may have an open shelter for fresh-air life. The site selected may be far from other dwellings in the woods, mountains, or the open country, or it may be close beside one's permanent home in a village, town, or city. Buildings of this kind can be constructed of various materials, such as stone, concrete, hollow tile, logs, or the ordinary stud frame covered with rough boards, slabs, finished lumber, or shingles. The floor plan for an open building depends largely upon the number of persons it is to accommodate, the locality in which it is to be placed, and whether it is to be used during the entire year or only in moderate weather. When isolated it should be arranged to include a kitchen and dining room, but when built as an addition to the home it is usually planned to have one or two open sleeping and living rooms with enclosed dressing rooms, toilets, baths, and closets.

Selecting a Healthful Site

As these structures are usually one story high, with the floor close to the ground. Before deciding upon a site it is

advisable to make a careful examination of the soil, in order to determine whether the ground upon which the open building is to be placed holds dampness for an abnormal length of time after wet weather. This can generally be ascertained by carefully noting whether water stands in the hollows on the land after rain or if the soil of the site is moist when nearby land is dry. Generally soils containing a fair amount of sand or gravel make healthful sites, for water drains rapidly through them and there is practically no danger from long continued dampness. Land with a clay soil should not be selected for a site if it can be avoided, as it does not drain easily and often holds a large amount of moisture after continued wet weather. A site on filled or "made land" may be an unhealthy situation and should not be chosen for a small fresh-air building unless carefully examined. Air is forced a certain distance into the ground and returns through variations in the atmospheric pressure, and when the soil contains a large amount of decomposing organic matter, the air which has permeated through it, may be mixed with unwholesome gases. Depressions and hollows on vacant land are often used as dumps for garbage, dead animals, and other waste material. This is covered when the land is graded and filled, and the air from such soil may be very unpleasant. Often in long settled and thickly inhabited towns the ground about many of the houses covers a number of old drains full of accumulated filth or is contaminated by refuse from cesspools, barnyards, or other unsanitary conditions. For these reasons care must be taken to obtain

some information in regard to the cleanliness of the soil before building an open-air dwelling in such localities.

In large cities the districts covered by private houses usually have a space for kitchen yards and gardens in the centre of each block. These yards offer good sites for small open-air bungalows and tents if the soil is clean, for they are usually well protected on all sides from high winds. In small cities where individual residences are placed in the centre of two or more building lots, fresh-air buildings can frequently be erected on a front or rear lawn and under shade trees.

Construction of Bungalows and Cottages

Generally simple frame buildings of a fairly permanent character are the best class of structures to erect for open-air shelters. The following suggestions in regard to their construction are given so that those desiring to build them may have a general idea of the material that will be needed, and can more easily obtain from a carpenter or builder an estimate of the cost of construction.

The Foundation

Buildings of heavy material should have foundations of stone or concrete, constructed in the usual way, and carried down to a solid footing below the frost line. Care must be taken to leave openings about the size of cellar windows in the walls on opposite sides of the building so that there may be good cross ventilation of the space between the floor and the ground, and these openings should

be screened to prevent animals from getting in under the floor.

Piers are cheaper and a more satisfactory foundation for wooden structures. They can be built of concrete, brick or stone, although bricks should not be used except when stone or concrete cannot be obtained easily, as they sometimes crumble when placed in the earth. Foundation piers are likely to settle and for this reason should rest upon undisturbed soil. Where the bottom of the excavation for the pier reaches rock or a hard strata of earth, piers may be raised directly upon it, but if the ground is soft it is wise to use a footing of coarse concrete or a few large stones at the bottom as a precaution against settling. Piers should be made eighteen inches or two feet square and placed at the corners of the building and in such other positions as will prevent the necessity for a long span of the sills or other timbers upon which the structure rests. When it is desirable to construct the building as economically as possible, posts may be used instead of piers for the foundation. They should be six inches in diameter, set well into the ground, and rest on a large flat stone for a footing. If they can be procured, locust or cedar wood posts should be used as they are excellent material for this purpose and will last for years. The life of all posts can be prolonged by coating them with a preparation of tar or creosote.

In building the foundation it is well to remember that the floor joists must be kept from one to two feet from the ground to prevent their becoming damp, but the building should not be raised higher than is necessary to obtain a

well ventilated air space under the floor, as the height from the ground detracts from the appearance of the structure. Buildings generally have an unsightly appearance when resting upon piers unless the openings be-

No. 85.—An open bungalow containing a small sleeping apartment and a large sitting room. (*Courtesy of "Country Life in America."*)

tween the piers are filled in as is shown in Illustration No. 91. This can be done with lattice work built of one by three inch boards for the frame and ordinary lath for the crosspieces.

The Walls

The simplest and cheapest covering in most localities for the exterior of the walls is rough hemlock or spruce boards, nailed to ordinary studding with the joints covered by narrow battens on the outside. Walls built in this way will be more durable if the boards are put on vertically and nailed to the sill and plate as shown in Illus-

No. 86.—An open cottage showing a cheap method of finishing the interior.

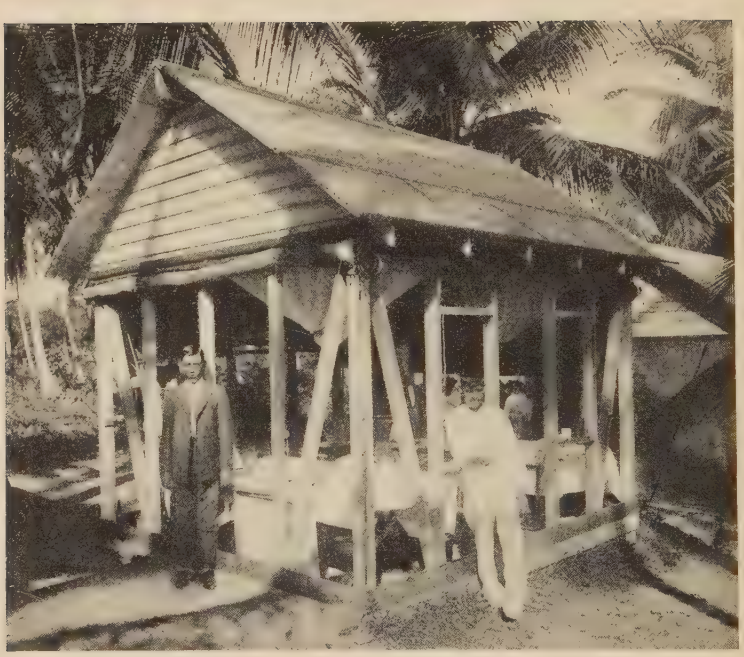
tration No. 85. They may be left unplaned, as rough boards make an artistic exterior and take stain much better than do those with a smooth surface. The battens should be one-half inch thick by three inches wide and nailed to only one of the two boards with which they come in contact when placed over the joints, as they are likely

to split through the shrinkage of the wide boards if nailed on both sides. Battens are not necessary if the wa'ls are made by laying the boards horizontally, but if this is done, the lowest board should be nailed flat against the stud and sill and the second and succeeding ones allowed to overlap each other an inch or two in the same way that clapboards are laid. Walls finished in this manner should have a post set at each corner that will project far enough to cover the edge of the boards. Walls may also be covered with novelty siding, clapboards or shingles, as these make a tight wall and do not need repairs as frequently as the rougher materials.

The Interior

After deciding upon the material to cover the exterior of the frame, the manner of finishing the interior of the walls should be considered. There are four different methods which may be followed and the one chosen should depend somewhat upon whether the building is to be used in very cold weather and heated at times, or is for use as an open shelter only. Open rooms for use in moderate weather can be finished in a very cozy manner by leaving the studding exposed, as shown in Illustration No. 86, and staining the entire inside of the outside wall covering. The rooms can also be given an artistic touch by tacking one of the various colored burlap cloths over the studding.

When the studs are left exposed they should be carefully spaced so that the distance between each timber of the frame and the corners will be equal. The interior appear-



No. 87.—A frame cottage covered with roofing paper and protected on all sides by canvas curtains.

ance will be improved when it is finished in this manner if timbers are carried entirely around the room on the same level and continuous with the sills that support the window frames and the pieces above the top of the frames. The exposed studding should not be planed, for when in the rough it will harmonize better with the inner surface of the outside sheathing and, if stained, all the lumber will take

the stain in the same manner. Should the building be for use in a cold climate, at least a portion of it must be heated, and it is then desirable that the walls be made tight by sealing the interior with narrow selected boards nailed to the studs, or by using one of the patent interior linings such as Beaver Board. If necessary, the walls can be still further reinforced to prevent the loss of heat by placing building paper under the sealing material, or by filling in the space between the studs with some non-conducting substance such as mineral wool.

The Roof

Open-air frame buildings are generally roofed with shingles or one of the patent roofing papers laid in sheets as shown in Illustration No. 87. Where these buildings are constructed of brick, stone, stucco, or cement, one of the more permanent roofing materials such as slate, tile, tin or asbestos shingles should be used. In building an ordinary shingle roof the rafters should be covered with sheathing boards and a layer of tar paper secured by lath strips laid between the boards and shingles. Shingles are apt to curl from exposure to the weather and should be protected by a coating of some preservative. To get the best results this must be done by dipping them in the solution and laying them out to dry before they are laid.

It is often wise to plan for a rather high peak or hip-roof over these buildings, as is shown in Illustrations Nos. 88 and 89, in order to get as large an air space above the rooms as possible, for this will help in keeping the interior

No. 88.—A cheap cottage with an enclosed apartment for domestic purposes, and open sitting and sleeping rooms.

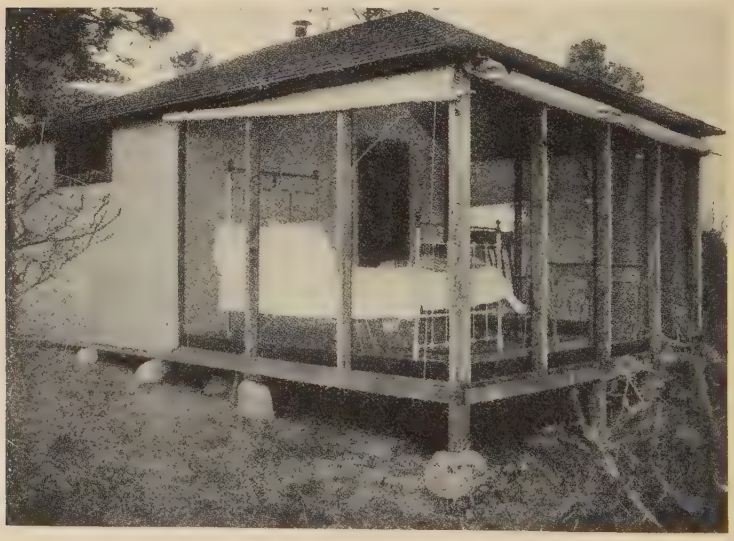
cool in hot weather. If the inside of the house is finished with the studding left exposed, the under side of the roof may be treated in the same manner or sealed with rough boards and the cracks covered with battens.

The Floors

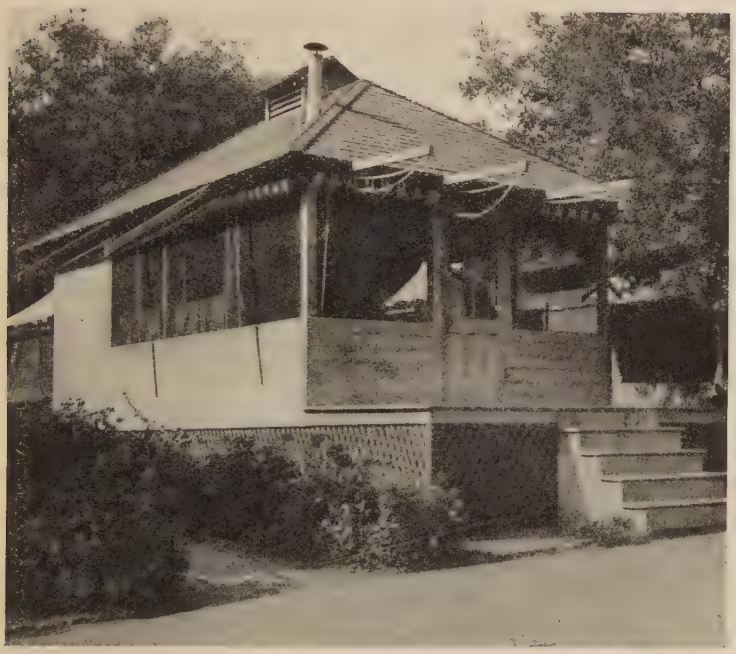
The flooring for buildings of this type should depend largely upon the class of material to be found in local markets. A good durable board floor is needed and it is

No. 89.—A well constructed cottage of the summer-house type, divided into a bedroom, bathroom, and clothes closets.

advisable to have it laid double throughout. When building in northern climates for use during the entire year, it should be insulated with building paper between the layers. The under flooring should be of matched boards and the upper layer of the best material the builder can afford. If economy is not necessary, a maple floor will be the most satisfactory. In locations where it is hard to obtain good flooring material, ordinary boards can be used and covered with linoleum. There should be a thick padding of newspaper placed over the boards before the linoleum is laid.



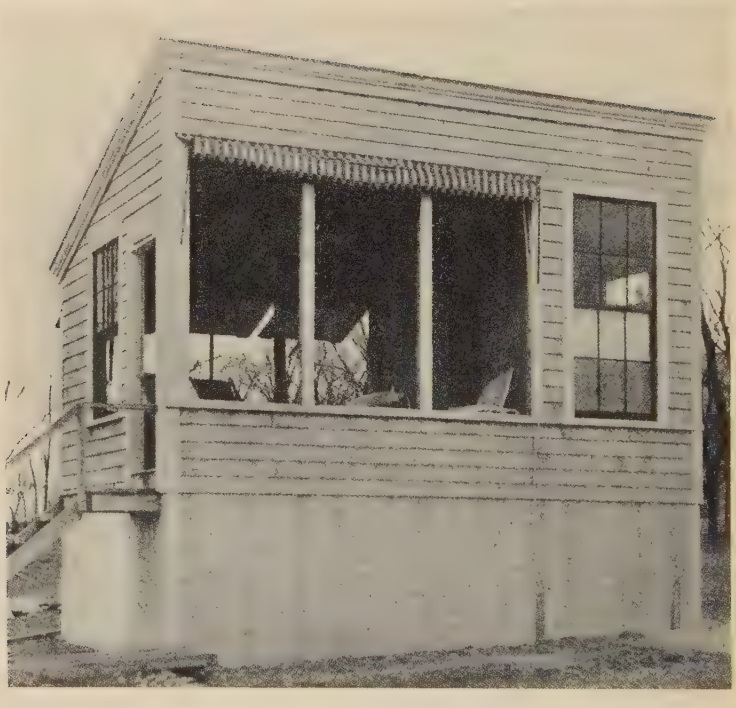
No. 90.—A cheap cottage of the summer-house type, with a sleeping room which can be opened on all sides.



No. 91.—A well ventilated cottage of the summer-house type, resting on piers with an air space below the floor enclosed by lattice work. (*Courtesy of Dr. F. M. Pottenger.*)

The Summer-house Type of Cottage

The cottages shown in Illustrations Nos. 89, 90, and 91 are modifications of the old-fashioned type of summer house which was quite common in country yards a few years ago. These buildings are of frame construction with sills supported either on piers or posts. The floors are



No. 92.—An inexpensive frame cottage of the lean-to type for open-air sleeping, with a dressing-room which can be heated. (*Courtesy of Dr. C. S. Millet.*)

raised about two feet above the ground, with an air space under them either open or enclosed with lattice work. They have a hip-roof covered with shingles and an air space between the ceiling and the roof to prevent the direct rays of the sun heating the interior. Buildings of this

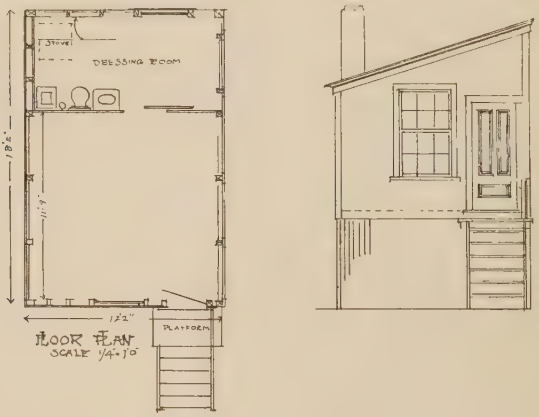
type are usually left unfinished or sealed with narrow selected boards and the openings protected by frames holding sash and glass or canvas curtains. Such cottages vary in size, but average about sixteen feet wide by twenty feet long, and the interior is divided into an open room in front with a dressing-room, bath, toilets, and closets in the rear.

The Lean-to Type of Cottage

The name used for this method of constructing buildings comes from the old-time Adirondack lean-to camp which was usually built of a framework of poles and covered with bark. The buildings as used at the present time have a flat roof with a slope to the rear, the back being closed with a low wall and the front more or less open and protected by glass and sash or canvas curtains.

The cottage designed by Dr. C. S. Millet (see Illustrations Nos. 92 and 93) is a frame building supported on cedar posts, sheathed with rough lumber, and covered with shingles. The roof is laid at quarter pitch with the rise to the front. There is no plastering or other interior finish, but the floor is laid double with the upper layer of narrow hard pine. The cottage is twelve feet wide by eighteen feet long, and is divided by a partition into a bedroom twelve feet wide by twelve feet long which is open on all sides, and a dressing room six feet wide by sixteen feet long. The inclosed room is lighted by two windows, heated by a stove, and furnished with a stationary washstand supplied with running water, a toilet, and a ward-

robe. The rear wall is six and one-half feet high, and faces the north and can be opened or closed by wooden shutters. The building was intended for one person and cost about two hundred dollars.



No. 93.—Drawings of Dr. Millet's cottage showing some details of construction.

The Turn-table House

This is a shelter which is very popular in European countries and is used on private grounds for one or two persons and at sanatoria for as many as ten or fifteen individuals. The building shown in Illustration No. 94 is a small structure about seven feet square set upon a turn-table and arranged so that the front can be easily moved toward the sun, and away from the wind or the direction from which a storm is coming. The crank for turning

No. 94.—The Turn-table house is a novel arrangement for outdoor sleeping, very popular in Europe. It can be given any exposure without difficulty. (*Courtesy of E. F. Hodgson & Co.*)

the building is on the interior so that it is possible to give the house any exposure without leaving it. The building is constructed of light boards laid in sections which are bolted together so that it can be taken apart or put up in a short time. The front is protected by a heavy canvas curtain attached to a roller, which may be drawn down in very stormy weather or when it is desirable to warm the building. On each side are extra windows for ventilation and light.

Slab Houses

Slabs may be used on the outside walls of small buildings. They are the first cuts from the sides of a log that has been sawed into boards and can often be obtained at a low price, as they are considered waste material in saw mill districts. Slab houses are built by sheathing the frame of the building with ordinary rough boards and nailing the slabs on the top of these. If the slabs are selected and carefully laid, the structure when completed will closely resemble a log house.

Log Houses

Open-air houses are also built of logs, but they are usually more expensive than brick or tile. When putting up a log house the butts and small ends are alternated to keep the joints as near horizontal as possible. Each log must be notched about halfway through at both ends in order to allow the logs from the adjoining wall to project through and make a tight joint at the corners and hold the two

walls together. Logs are sometimes planed on two sides so as to make a level surface where they come together. It is cheaper, however, to lay them up without doing this and caulk the cracks and chinks between them with coarse plaster.

Tree Houses

When a tree house is mentioned one usually thinks of a children's playroom elevated among the branches of an old tree near a country mansion. But tree houses are also used in many parts of this country and in Europe for outdoor sleeping purposes. There is a novelty and charm about such a location which gives a feeling of height, airiness, and safety to the outdoor sleeper housed among the leaves and boughs of a great tree. The woods and particularly the evergreen forests are ideal sites for these buildings, but tree houses can often be seen in the yards of country homes and occasionally perched among the branches of large trees in the suburbs of cities.

Tree houses can be built in one tree if there are two or more limbs that extend out at a convenient angle for supporting the structure at a desirable height from the ground, or they may be built in a grove when four or more trees strong enough for the purpose stand in a good position for building between them. When the site has been selected, the first necessity is a platform with a stairway leading to it. This should rest on four by six inch timbers when the space is wide between the bearing points on the trunks or limbs, although four by four inch

beams will be heavy enough if the supports are fairly close together. After two or more beams have been well secured on the same plane, floor joists can be laid upon them and planks or floor boards laid double and nailed to the joists. After a substantial platform has been constructed the shelter can be raised upon it in the same manner as when building the walls and roof of a cottage upon the ground.

The tree house shown in the frontispiece is supported by the trunks of trees and is over twelve feet above the ground. It is built of rough lumber covered with slabs, and the roof is sheathed reinforced with roofing paper and battened with slabs.

CHAPTER X

Suggestions for Planning New Houses With Open-air Apartments

THE increasing demand for sleeping porches and other fresh-air living apartments has recently brought about numerous changes in the planning of dwellings, and one may say perhaps without exaggeration that a new style of architecture has been developed. Sleeping porches, loggias, open living and dining rooms, sun parlors, and numerous windows are replacing the rooms which a few years ago were considered comfortable when snugly inclosed, but which it is believed had much to do with the great increase of tuberculous disease during the nineteenth century.

Selecting the Site

In planning a new house to be situated in the suburbs of a city or a country district, a healthful site is a most important requirement, although often its sanitary state is the last thing to be considered. A healthy site tends to make a healthy home, and a building to be healthy needs

the free circulation of air on all its sides, and as much sunlight as can possibly be obtained. The larger the space allowed between adjacent houses the healthier will be the individual dwelling. Before erecting a building the site should be carefully studied in order to place the house in the best possible situation, and to see that its position will not prevent the free circulation of air over the land. The air which enters the home should also be pure, but the atmosphere over land saturated with impurities or which has been filled in with refuse may be unwholesome. For this reason a site near factories, filthy yards, old outbuildings, unsanitary drainage conditions, or locations receiving the surface drainage from higher levels, and close to deep undrained depressions, marshy ground, or filthy streams should not be chosen. The ground upon which the building is to be erected should slope away in all directions, and natural drainage streams should be large enough and have a sufficient drop to remove rapidly the water which falls in the vicinity.

Some Points on the Sanitary Arrangement of the Interior

It should be remembered when planning a home that a healthy dwelling is even of more importance than beauty, comfort, and coziness, although all of these desirable qualities can be obtained under the same roof if the house is designed and constructed in accordance with modern sanitary knowledge and based upon the following rules:

1. The cellar or basement should be high, well lighted

and ventilated, and its entire floor covered with well laid cement.

2. The foundation should be of stone or concrete, carried to a solid footing, especial care being taken to see that the cellar walls are constructed in a manner that will prevent their becoming damp.

3. Floors should be laid double throughout the house, and the finished floor surface of some hard, smooth wood treated with a filling material and varnished or waxed.

4. The plumbing should be open; that is, all pipes must be kept outside of walls and partitions, and in no case boxed, but entirely exposed so that they are under constant observation.

5. All rooms should be well lighted by large windows, which can be opened both at the top and the bottom, and wherever possible windows should be placed in such a position that cross-ventilation can be obtained.

6. Bedrooms should not be small and box-like, but large and airy, having at least one thousand cubic feet of air space for each occupant, and the windows and transoms over doors arranged so that cross-ventilation can easily be obtained. Storm sash when used should be hinged or arranged in such a manner that they can be opened for the entrance of air. The surface of the walls should be painted or calcimined and not papered, so that it may be renewed at frequent intervals.

7. The sanitary arrangements of servants' bedrooms, toilets, and baths should be planned in the same careful manner as the rest of the dwelling.

No. 95.—The interior of a loggia. The walls are plastered and the floor and ceiling are of hard wood.

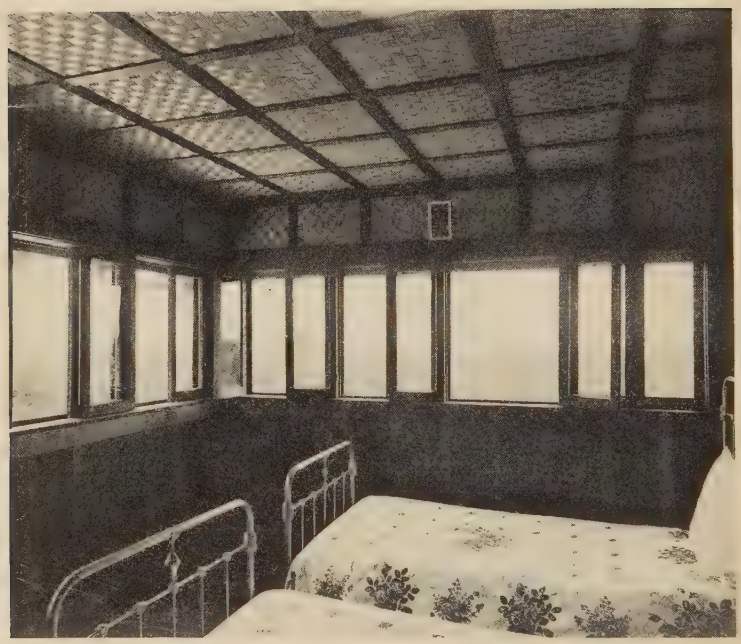
8. Toilet and bath-rooms should have large windows and be placed so that the direct rays of the sun can reach the interior of the rooms.

Preparing Apartments for the Sick

When designing a new home or remodeling an old one, it is often necessary to provide an apartment for some member of the family suffering from a chronic disease. It

is very important both for the comfort of the invalid and for the health of the family as a whole that proper arrangements for such an apartment be made, particularly if the person afflicted has tuberculosis. The rooms chosen for the purpose should be on the south side of the house, connected with an open loggia or porch, and prepared in such a manner that absolute cleanliness can be maintained with as little trouble as possible. In order to keep them in this condition the walls and ceilings of inside rooms should be plastered with hard plaster and coated with enamel or ordinary paint covered with varnish. Colors may be used, as tinted walls are more pleasing to the eye and are as sanitary as plain white when treated in the same manner. Either a light olive or one of the yellow tones will be found agreeable. There should be no cornices or mouldings of plaster or wood to catch the dust. Corners and angles where walls and ceilings join should be rounded and all open spaces between the baseboard and the walls filled with hard plaster before the walls are painted. If the interior finish is of soft wood, it should be painted or stained and varnished. Hard wood can be done in oil or varnish, but all cracks in the baseboard, doors, window casings, and other woodwork must first be filled. The floor should be of narrow hard wood boards carefully smoothed, the cracks filled, and the surface finished with an oil and wax dressing.

Closet walls, ceilings, and floors should be carefully treated in the same manner as the walls and ceilings of the rooms, and cracks in the shelves and between the shelves



No. 96.—An attractive fresh-air sleeping room protected by casement windows. (*Designed by Mr. E. T. Barnes. Courtesy of "House and Garden."*)

and walls, as well as old screw holes and holes around hooks, should be filled. It is very important that closets in the rooms used by tuberculous patients be well lighted and ventilated.

Both the inner rooms and the porch should be carefully screened against insects with wire screens on metal frames, and painted with specially prepared paint, at least once each season.

The Planning of Fresh-air Rooms

In designing fresh-air rooms it should be remembered that these apartments are more or less exposed to the weather and should be finished in a way that will prevent the walls and floor from being injured or defaced by dampness and exposure to the sun's direct rays, as shown in Illustration No. 111. Fresh-air rooms are usually built either as porches standing out from and treated as a trimming in the architectural design of the building, or loggias which are porticos or galleries contained within the structure as shown in Illustrations Nos. 95 to 98.

No. 97.—A small frame bungalow covered with shingles. There is a fresh-air room at each end open on all sides.

No. 98.—A simple, artistic, frame bungalow with a large porch on the front and a loggia in the rear.

These apartments must be located where they will harmonize with the exterior of the house and look well from a distance, and not as if they were built for convenience without thought of their appearance. It is because of these requirements that the exact dimensions of such apartments cannot be given, but must be determined as the design of the house is evolved. Wide porches and loggias cut off the light and air from the rooms behind them to a certain extent, and for that reason it is desirable to place them in front of rooms which receive light and air from two sides. This method has been followed in all the plans shown in this chapter, with the exception of one

or two instances where direct light and air are received through a window at one end of the inside room beyond the reach of the porch. Where a house is to be constructed on a city or town site, the size of the lot will be the determining factor as to the location of the porches. If the lot is narrow, the open rooms must be either in the front or rear, but when there is sufficient space it should be placed in the most secluded spot.

A Country Home Designed for Open-air Life

The house shown in Illustrations Nos. 99 and 100 was designed by Mr. W. K. Shilling, to meet the present demand for outdoor living and sleeping apartments, and is described here through the courtesy of the editor of "Country Life in America." The exterior of the house is plain to the point of severity, depending wholly on structural features and proportion for effect. The walls are of solid concrete, waterproofed on the inside with a damp proof compound, the outer surface being finished with crushed quartz washed with a solution of hydrochloric acid in order to expose the surface of the particles and produce a play of color in sunlight. The terrace forms an effective base for the house, and connects the entrance and porches in an attractive manner. The porch and terrace floors are of cement laid over gravel filling with quarry tile inserted to add a decorative finish.

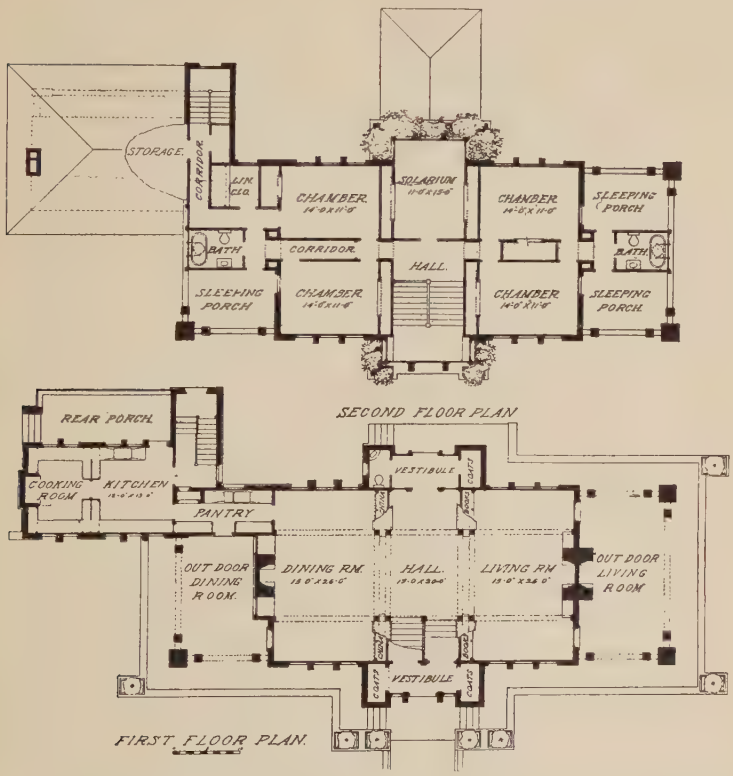
The principal entrance is directly on the grade, and leads through to a vestibule into a large square central hall. To the right is the living-room, extending through the

No. 99.—A country home with outdoor sleeping, dining, and living rooms. (*Designed by W. K. Shilling. Courtesy of "Country Life in America."*)

depth of the house. Beyond this is the outdoor living room, supplied with a large fire-place for use on cool evenings. To the left of the hall lies the dining room, of the same dimensions as the living room. Beyond this is the outdoor dining room connected directly with the butler's pantry, which makes it as convenient for serving meals as the dining room proper. The kitchen opens from the butler's pantry and is a unique feature of the house as it is divided into two sections, the kitchen proper in which is done the general work, and a separate room for cooking only. By this arrangement all the heat and steam are kept from the kitchen, making it as comfortable as any part of the house. There is a servants' porch at the rear of the kitchen, well screened from the rest of the building.

In the cellar are the laundry, heater, and storage rooms for fruit, vegetables, and fuel.

The hall and inside living-room and dining-room which



No. 100.—Plans of a country home. The open rooms can be inclosed with glass in winter. Those on the second story are all connected with a bath. (*Designed by W. K. Shilling. Courtesy of "Country Life in America."*)

constitute the first floor are practically one large room. This scheme gives an effect of spaciousness and makes a livable house as well. The porches which constitute the outdoor living and dining rooms can be inclosed with glass during the cold months, thus forming delightful winter gardens or sun parlors.

On the second floor are three outdoor sleeping rooms connected directly with bath rooms and chambers. The floors of the upper porches are of reinforced concrete, and each porch is fitted with insect screens and canvas shields. The bath room walls and floors are insulated to prevent freezing and the wainscoting and flooring are of tile. The windows are all of the casement type, located on opposite sides of the rooms to insure good ventilation and an abundance of sunlight. The roof is of red shingle tile with a projecting cornice and hanging gutters.

The cost of constructing the house will vary in different parts of the country, but the following is an estimate based on prices in a given locality:

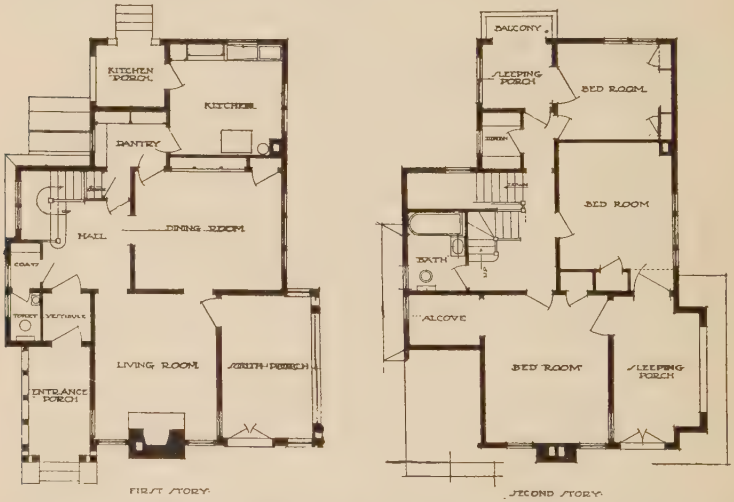
Excavating	$ 110.00
Cement, etc.	3,175.00
Carpenter, etc.	3,650.00
Plastering	410.00
Roofing and sheet metal	780.00
Painting and glazing	475.00
Mantels	250.00
Tile floors, etc.	210.00
Hardware	165.00
Plumbing	500.00
Heating (furnace)	200.00
Total	$9,925.00

No. 101.—An artistic frame house with a sun parlor and sleeping loggia. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

A Frame House with Two Open-air Apartments

The frame house shown in Illustrations Nos. 101 and 102 was designed to provide an ordinary country home with a large fresh-air sitting room on the first floor and a sleeping loggia on the second. The building is situated in a cold climate and all the walls with the exception of those inclosing the open-air rooms are well insulated. This is done by placing on the outside of the frame under the shingles two layers of shiplap siding and heavy sheathing

paper. The house is covered by a gambrel roof which is a particularly good type for cold countries, as it is steep and heavy masses of snow slide off easily. In this instance the insulation is carried well up on the roof to the height of the attic ceiling. There is an air space between the



No. 102.—Plans of a frame house showing position of the sun parlor and relation of the sleeping loggia to two bedrooms. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

shingles and the sheathing of the roof which is made by placing one-inch strips between these layers. All the floors in this house are laid double with an insulation of felt between the two thicknesses of flooring.

In studying the floor plans it will be seen that the en-

trance porch on the front of the house is entirely separate from the open-air sitting room. This arrangement is intended to insure the same privacy and isolation to those occupying the sitting room as would be obtained in an ordinary drawing room. The open-air rooms are in the most advantageous positions, with south and east exposures, and their walls are finished with shingles as a continuation of the exterior walls of the house. The open sitting room is entirely inclosed with glass in sash which slide horizontally on the side and open as casement windows on the front. The ceilings of both open rooms are ceiled with narrow North Carolina pine boards, and the floors are laid flush with the inside floor in order that beds and other furniture can be readily moved from the inside or outside rooms without difficulty.

A Brick House with a Sleeping Porch

The house shown in Illustrations Nos. 103 and 104 was designed by Mr. Gustav Stickley, and is described here through the courtesy of the editor of "The Craftsman." It is simple in outline, but the very plainness of its walls and the clean unbroken angles, give it an air of durability as well as comfort. The variety in the sizes and sorts of windows suggest, in some indefinable way, quiet retired nooks. In the same way the design of the porch gives the idea of protection and hospitality. Two square pillars rise to the full height of the walls to support a beam upon which rests the roof, which projects beyond the main eaves to cover the sleeping balcony below. This balcony

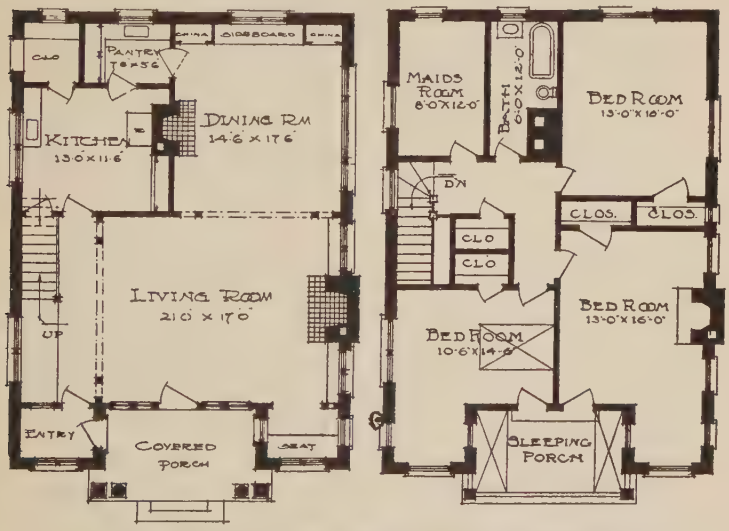
No. 103.—A brick house with a sleeping porch. (*Designed by Mr. Gustav Stickley. Courtesy of "The Craftsman."*)

is supported upon two wooden pillars and upon brackets against the side of the house, and forms the top of the porch on the ground story. The wooden construction stands slightly withdrawn into the house, protected from winter storms, and sheltered from the heat of summer.

The walls of the house are of dark red brick set with wide joints. The roof is covered with rough slate, deep green in color. The angles are edged with Spanish tiles that repeat the red of the walls. The exposed rafters and purlins are of cypress chemically treated to a soft brown which, coming between the red of the wall and the green of the roof, weaves the two colors together and

brings them into a fuller harmony. Thus the general tone of the house is dark, but this is relieved of all tendency toward somberness by the inner pillars, the sleeping porch that they support, and the frames of the windows, all of which are painted white.

Upstairs, the bedrooms are large and airy with commodious closets, and the sleeping porch is a good sized room itself. Below, the big living room runs across the front of the house. At one side, the stairs to the second story lead up from a long raised landing. The house may be entered by French doors, opening from the back of the



No. 104.—Plans of a brick house showing relation of sleeping porch to the bedrooms, and the interesting arrangement of the first floor. (*Designed by Mr. Gustav Stickley. Courtesy of "The Craftsman."*)

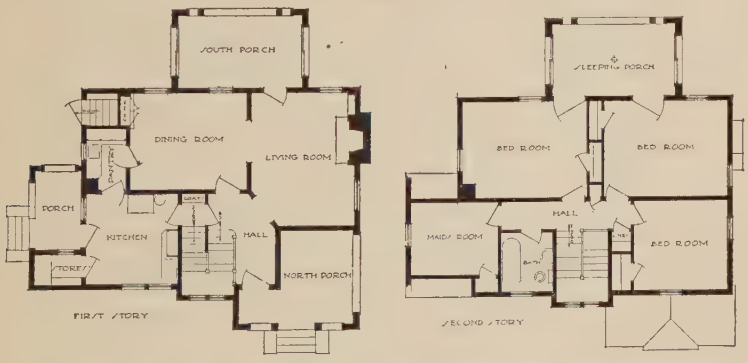
No. 105.—A house with an entire wing of open rooms. (*Designed by Messrs. Scopes and Feustmann. Courtesy of "House and Garden."*)

porch directly into the living room, or by the more formal entrance which opens first into a vestibule. The dining room is practically a part of the living room, and its outside wall is almost wholly taken up by a group of windows.

A House with an Entire Wing of Open Rooms

The dwelling shown in Illustrations Nos. 105 and 106 is a small frame structure containing an open-air sitting room and a sleeping loggia. It was designed for a northern climate, and the walls with the exception of those in the open rooms are insulated with Cabot's sheathing quilt,

held in place by strips of lath nailed in the angles made by the studding and sheathing boards. There is a large north porch in connection with the front entrance which can be used for fresh-air purposes in summer, but the interesting portion of the building is the free standing wing at the rear which is treated by itself as an architectural feature, and contains the open rooms having a southern exposure. From the outside, these apartments have the same appearance as the main part of the house, and the walls up to the line of the window-sill of the second story appear to be constructed in a like manner although they are merely studding and shingles. The interior of the loggias are finished with shingles to correspond with the exterior of the building. The east and west sides are protected by sliding sash and glass, but the southern exposure is left open.



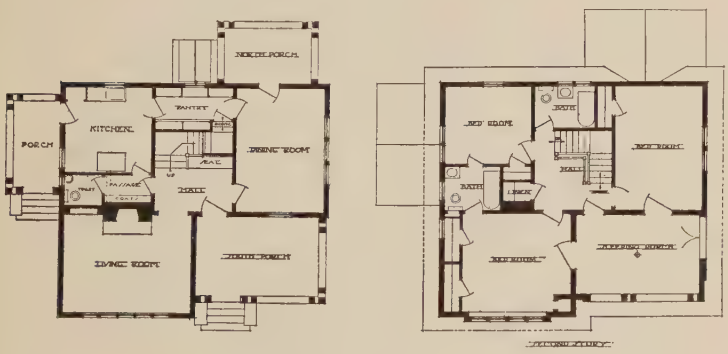
No. 106.—Plans for a house with a free standing wing used for fresh-air apartments. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

No. 107.—A small house with a pleasing exterior arranged to have an outdoor dining room and sleeping loggia. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

A House with an Outdoor Dining Room and Loggia

The small house shown in Illustrations Nos. 107 and 108 faces the south, and besides containing an open-air dining room and sleeping loggia has a large porch in connection with the entrance which is used for fresh-air purposes. The first story is of frame construction insulated with heavy building paper, and finished on the outside with a special novelty siding left in the rough, and stained a light brown. The second story is finished in cement and lime

stucco over galvanized metal lath and insulated between the studs with Cabot's quilt. The open-air dining room is sealed with rough novelty siding to correspond with the exterior walls of the house and entirely inclosed with sash and glass. The side walls of the sleeping loggia are finished with stucco and the ceiling ceiled with North Carolina narrow pine boards. The loggia is connected with two bedrooms and a hall, is open on the south, and protected by casement windows on the east. The south wall of the large front bedroom is almost entirely made up of windows, and cross ventilation can be obtained through the door into the loggia. The west side of this room is given up to closet space as the gable roof at this point somewhat cuts down the height of the outer walls.



No. 108.—The plans of this small house were designed to give the outdoor dining-room a northern exposure and place the loggia on the south side. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

No. 109.—A little house with big comforts which include a large first floor porch and a sleeping loggia. (*Designed by Mr. Gustav Stickley. Courtesy of "The Craftsman."*)

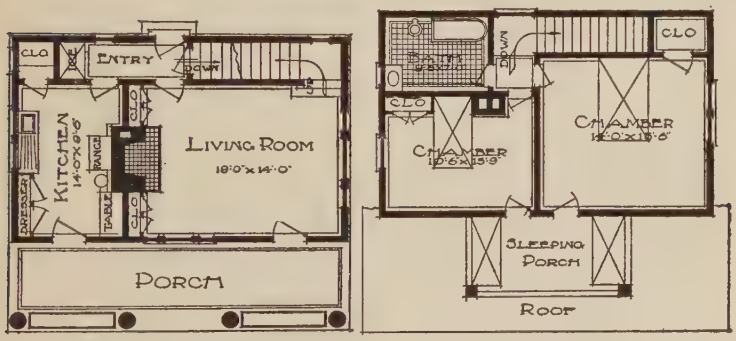
A Little House with Big Comforts

The house shown in Illustrations No. 109 and 110 was designed by Mr. Gustav Stickley, and is described here through the courtesy of the editor of "The Craftsman." It is twenty-eight and one-half feet by twenty-six feet, including the porch, and contains all the comforts and conveniences essential to a normal life of a small family in the country or in a suburban town.

The walls are covered with broad weather-boarding which gives them a rugged and interesting texture. The floor of the porch is of cement, so that it may be easily cleaned with a garden hose. The pillars with the flower

boxes between them, forming a low parapet, are of the same material.

Within, every effort has been made to utilize the floor space to the best advantage. There is no dining room, but the porch may be used for the purpose in mild weather as both the kitchen and living room open on to it by broad French doors. The walls of the living room contain a great deal of glass, for besides the windows opening upon the porch there is a group of windows at the end of the house, and the room is as light and airy as one in a larger building would be. A high wainscoting of V-jointed boards runs almost to the ceiling. The plaster is rough and is colored to harmonize with the woodwork. The chimneypiece is of split field stone with a hearth of rough tile, and the fireplace has a hood of hammered iron which aids in heating



No. 110.—Plans for a little house. The arrangement of the living room and kitchen is interesting. The loggia can be entered from both chambers. (*Designed by Mr. Gustav Stickley. Courtesy of "The Craftsman."*)

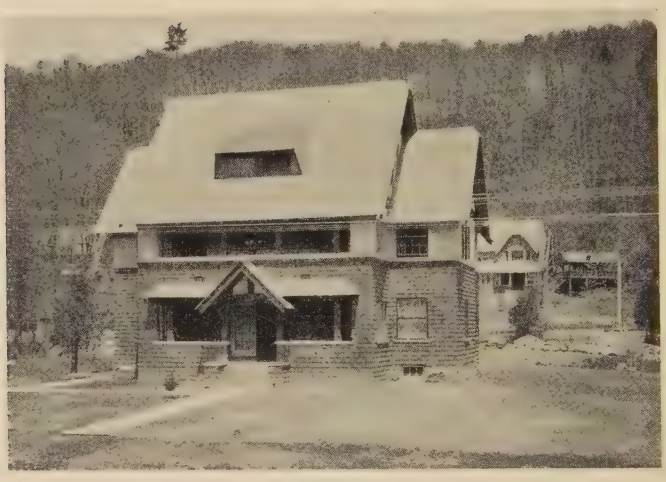
No. 111.—An artistically arranged and appropriately furnished outdoor sitting room in a country mansion. (*Courtesy of "Country Life in America."*)

the room. The fire-dogs are also of iron, as are the little lanterns suspended from brackets set into the rough stonework on either side of the chimneypiece, which greatly increase the interest of this end of the room, at the same time throwing a convenient light into the bookcases beside the chimneypiece. The wooden paneling in these bookcase doors, and the finish of iron locks and handles, give them an unusually solid appearance and the whole house has a sturdiness about it that adds to the charm.

The kitchen is well furnished by the built-in fittings. On one side of the room is a large cupboard containing a store closet with drawers below, and china closets above. Opposite this is a counter shelf which has a closet and several drawers beneath it, and the arrangement is raised upon three-inch legs so that it is possible to stand close to it. Behind the kitchen is a cold closet and an outdoor ice-box. The stairs lead from the corner of the living room to the second story, which contains two large chambers with good closets and a bath room.

The sleeping porch has been managed by means of a

No. 112.—An attractive fresh-air sitting room entirely inclosed by triple hung glass and sash windows.



No. 113.—An interesting frame house with four open rooms under the main roof. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

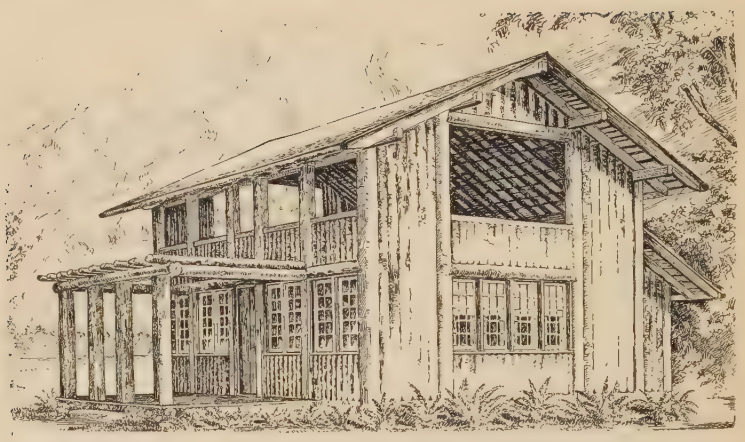
dormer roof broken through above the porch. No essential convenience is missing in the little home, and there is much beauty in its structure and finish.

An Interesting House with Four Open-air Rooms

The house shown in Illustrations Nos. 113 and 114 has four open-air rooms, an unusual arrangement of the floor plans, and a pleasing exterior. The lower story is of frame construction, and the second story of stucco over galvanized metal lath. The entire outer walls are insulated with Cabot's quilt, carried high up on the gable roof above the ceiling of the third story.

On the first floor are two loggias, one used as a sitting, the other as a dining room. The front of the house has a southern exposure, and the main entrance is through the open-air sitting room. The open-air dining room has a northern exposure, but also receives the sun from the east and is inclosed with sliding sash and glass. The sleeping loggia on the south side of the house is large and will accommodate four beds. It is open on the front but has glass and sash protection on both the east and west sides. The north loggia is protected on the east by casement windows and on the north by sliding sash. The interior walls of all the open rooms are finished in the same manner as the exterior walls, in order to harmonize in an artistic manner with the outside of the building.

No. 114.—The plans for this frame house provide open dining and sitting rooms, and a large and small sleeping loggia. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)



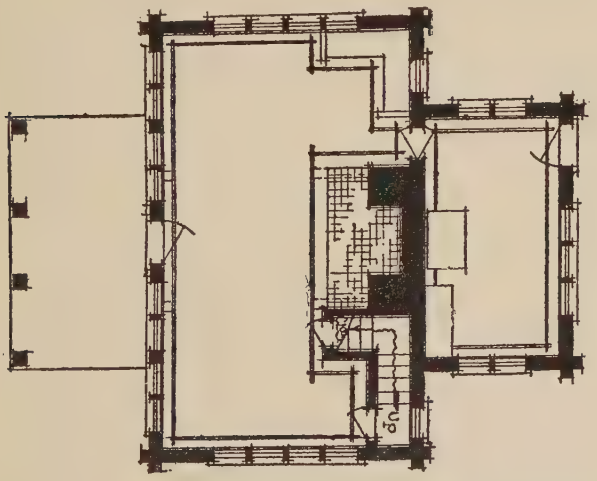
No. 115.—A summer log house with the entire upper floor arranged for open-air sleeping. (*Designed by Mr. Gustav Stickley. Courtesy of "The Craftsman."*)

A Summer Log House

The log house shown in Illustrations Nos. 115 and 116 was designed by Mr. Gustav Stickley, and is described here through the courtesy of the editor of "The Craftsman." It is constructed of logs placed in an upright position and the main feature is the open sleeping room. The logs may be of either chestnut, cedar, oak, or whatever wood is most convenient to the land to be built upon. If chestnut, the bark should be removed; if cedar, it may be left on. Logs from which the bark is removed weather to a beautiful rich tone, one impossible to duplicate by a stain. The chinking is of Portland cement and sand (one

part cement and three parts sand) and, therefore, permanent. It will take a stain like the logs if desired or will weather with them to a soft natural lustre. The shingles on the roof should be split instead of sawed, for when sawed a nap is left which discolors, turning them an ugly brown instead of the soft colors that time gives the split shingles. The logs can be hewn if desired, though where they fit together they will give a better bond and will hold the cement chinking tighter if left unhewn, which insures greater permanence.

In order that the house may be constructed as cheaply as possible there is only one chimney in the plan. The



No. 116.—The first floor plan of a summer log house showing the arrangement of fire-place and windows. (*Designed by Mr. Gustav Stickley. Courtesy of "The Craftsman."*)

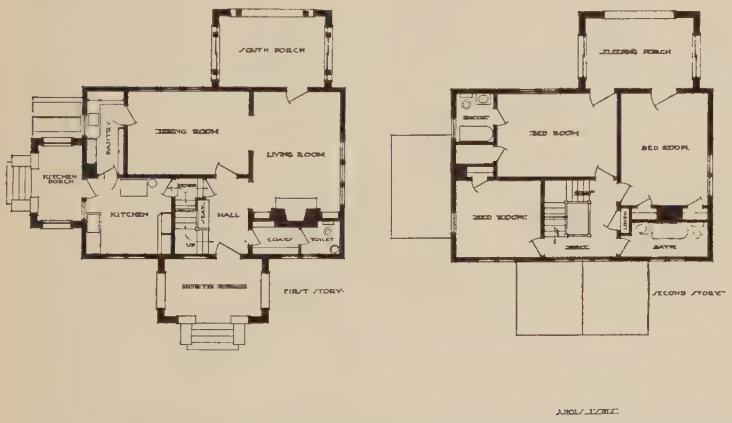
No. 117.—A country house with an open-air sitting room and loggia. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

main room is to be used as the dining-room. The windows are of the casement variety which are much cheaper than double-hung windows, and can be easily removed and screens inserted for the summer months. The board floor can be made of North Carolina or yellow pine.

A House with Two Open-air Rooms

The country home shown in Illustrations Nos. 117 and 118 has a large open-air sitting room and sleeping loggia. The house is of frame and stucco construction, with an entire wing in the rear under a separate gable given up to the open-air apartments. These are designed in the form of loggias with the southern front open to the weather and

the east and west sides protected by casement windows. The interior walls of the open sitting-room are finished with shingles to harmonize with the exterior of the house. The ceiling is ceiled with narrow North Carolina pine boards, and the floor boards are laid in white lead and oil, with a pitch of one inch to five feet. The walls of the sleeping loggia are of stucco, and the floor and ceiling are constructed in the same manner as in the sitting room. Both open rooms are drained through scuppers or holes at the floor level, which are fitted with little trap doors hung from the top to prevent the cold air entering the loggias about the feet.



No. 118.—Plans of a country house designed to place the fresh-air rooms in a wing under a separate gable. (*Designed by Messrs. Scopes & Feustmann. Courtesy of "House and Garden."*)

CHAPTER XI

Roof Playgrounds for Children

The Need for Playgrounds

PRIVATE and public roof playgrounds for children are found scattered through almost any large city, but they are few in number when compared with the many good sites that might be used for the purpose. The roof space in the crowded sections of every city should be utilized for the open-air life of children, as they particularly need good air and can get it in a much purer state on the tops of buildings than in the dark, dirty, and dangerous streets. The beneficial effects of the action of fresh air upon the child's body and mind cannot be too strongly expressed. Exercise and pure air dilate the air cells of the lungs, increase the chest expansion, aid in the removal of waste material, and purify the body, thus diminishing the possibility of illness through infection by disease germs. Fresh air is now taking the place of medicine in the treatment of a number of the diseases of childhood, and is the chief remedy in the cure of tuberculosis and pneumonia, for it helps nature to throw off and conquer the bacteria which produce the poison of these diseases.

Cities were built for the use of grown-up people, and little thought has been given to the needs of children in the gradual growth and development of towns. While good homes are, of course, found in cities as well as in the country districts, there is little doubt but that there are more sickly boys and girls in the city than there are among the same number of children in the country. Many children know no better home than the crowded tenement, and no other life than that of the congested streets of city slums. For such children, the roof playground is a moral as well as a physical safeguard, and the ill effects of city life can be diminished to a marked degree by providing for them an open space above the streets upon which they may safely play.

Usually, the air in inclosed spaces is not pure, and particularly is this true of buildings where large numbers of people are housed or congregate. Children are generally confined in schoolrooms during a large part of the day, and they should therefore be provided with open spaces where they can breathe pure air at other times. A child cannot get too much fresh air, and there is practically no limit to the benefit growing children derive from playing where they can breathe it. Not merely the child's health, but his capacity for learning will increase, and his mental faculties be stimulated, by providing more favorable conditions for his play. For sickly children who are not able to attend school, an open-air playground is of even more importance than for the healthy, and parents should in such cases follow the methods of the open-air schools and

provide reclining chairs and sitting-out bags, so that their children may have a fair chance for the better health which may be gained in the open air.

It will be found in many cases, where weak and sickly children have no definite disease, that a free life in the open will increase their appetite, size and weight, make them more alert, and cause nervous and irritable symptoms to disappear. Children who are confined in closed rooms become mentally weary quicker than those who live out of doors, and their capacity for learning is less, for perfect health produces the best brain action. There is a close relationship between bodily strength and mental power, and the impairment of physical vigor soon weakens the mental capacity.

Positions for Roof Playgrounds

The flat roof of almost any well constructed building may be used as a playground. (See Illustration No. 119.) Even a very small space will give pleasure to little children, and afford them an opportunity to breathe fresh air. In planning a playground its size must, of course, depend upon the roof space that can be used for the purpose. Even a roof area as small as eight feet by ten feet should not be rejected when it is impossible to provide a larger one. In addition to the flat roofs of large buildings, there are in most cities rows upon rows of two and three story houses with low, flat-roofed extensions in the rear. (See Illustrations Nos. 121, 123, and 124.) The tops of these extensions are generally well protected from the wind,

No. 119.—A steel frame over a playground on a private dwelling for the support of wire netting and weather protection. (*Courtesy of Dr. W. P. Northrup.*)

and make ideal sites for small playgrounds and roof gardens.

In order to make these little breathing places attractive, long, narrow flower boxes, made like the ordinary window-

box can be placed around the edge of the roof inside the parapet, and vines and flowers may be cultivated as is shown in Illustration No. 120. Some fast growing ivy or rambler, planted at various points along the side of the playground, will soon spread over the entire wire netting, making an attractive screen.

The Construction of Roof Playgrounds

The construction of a roof playground or an open playroom is a simple matter. In cities where the fire laws will

No. 120.—A garden and playground on the roof of a model apartment building. (*Courtesy of the Playground and Recreation Association.*)

No. 121.—A playground on the roof of the rear extension of a city dwelling. (*Courtesy of Dr. W. P. Northrup.*)

permit the use of wood, the problem is only one of local conditions, and the needs of each individual case can usually be settled cheaply. In its simplest form, a playground consists merely of a platform surrounded by a fence, or if some form of shelter is desirable, an open shed with only a roof and one or two sides inclosed may be erected. A more elaborate plan is to inclose the playground with large mesh wire netting that can be covered by canvas curtains to keep out the wind, rain or snow, in stormy weather. Tents are sometimes used in place of

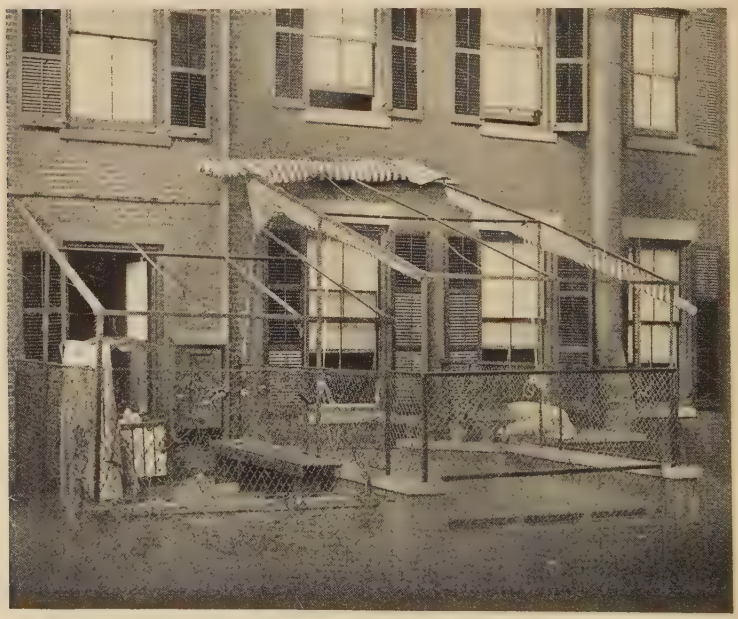
wooden and iron shelters and are fairly satisfactory while in good repair, but they do not last long. Of course, throughout the year, there are days and sometimes an entire week when no simple device will afford adequate protection. At such periods the children will be driven indoors by the storms, and then is the time to practice the open-air theory by the simplest of all devices, the open

No. 122.—A roof playground on a model tenement house in New York City. (*Courtesy of the Playground and Recreation Association.*)

No. 123.—An inexpensive playground supported on an extension roof of a city dwelling. (*Courtesy of Dr. R. L. Dickinson.*)

window. Of course, this is not possible in all homes, but where a room in a corner of the house can be given up to the children, two sides of it may be opened to the fresh air, and children in their outdoor dress allowed to play there.

The cheapest form of roof playground is made by laying two by four inch timbers on edge about two feet apart over the roofing, and on these nailing ordinary floor boards.



No. 124.—A small playground partly inclosed with large mesh wire netting, and protected by canvas curtains. (*Courtesy of Dr. W. P. Northrup.*)

No. 125.—A large playground showing method of roof construction. (*Courtesy of the Playground and Recreation Association.*)

Around the edge of the floor thus formed, at about five foot intervals, are placed four by four inch timber posts, six feet high, which should be well braced. To these posts a heavy large mesh wire netting is nailed. Where the width of the playground floor is not great, two by four inch timber rafters can be laid across the ground between each of two opposite posts, and the entire space covered with netting. If the ground is too wide for a single span, a row of four by four inch posts may be placed in the centre

of the floor, and rafters laid from both side posts to the centre row, and then covered with wire netting. When the entire space is inclosed in this way a safer playground is made, for children with an adventurous spirit cannot climb up over the sides. The supports can also be used for light swings and other gymnasium equipment, and the netting may be used to hold up canvas curtains for protecting the playground during wet weather.

When it is not necessary to build in the most economical

No. 126.—A well built playground entirely inclosed with large mesh wire netting. (*Courtesy of Dr. W. P. Northrup.*)

No. 127.—A large, well protected playground on the roof of a New York City settlement house. (*Courtesy of the Playground and Recreation Association.*)

manner an iron fence may be used, and if it is desirable to inclose the entire playground, a steel framework as shown in Illustrations Nos. 119, 126, and 127 should be erected over it, and wire netting attached to the frame.

There are various methods of laying floors for a playground. If a cheap board floor as described above is used, care must be taken to protect the boards in order to prevent deterioration by the weather. This can be done by oiling the boards occasionally or by painting the floor once

or twice during the year. Another flooring, which is somewhat more expensive but wears better, is made by laying narrow floor boards about one-quarter of an inch apart and rounding the edge of each board. This manner of laying the boards helps to prevent the flooring from becoming uneven through warping and curling, but these floors also need either oil or paint for protection.

If a permanent fireproof playground is to be constructed, the roofing material of the building upon which it is to rest should be removed and a reinforced concrete floor laid in its place, with an upper finish of one of the composition cement floorings or of tile.

Many playgrounds are entirely open to the weather, but if children are to use them during all seasons of the year, a shelter under which they can play during rainy weather is desirable. A temporary shelter can be made as described above, with canvas curtains spread over wire netting or a permanent shelter erected with an iron framework covered by corrugated iron sheets. In some situations the walls of the building may be carried up at one corner of the playground, preferably on the north and west side, and an ordinary roof of the same material as that used in the building upon which the playground rests laid over the corner protected by these walls.

CHAPTER XII

Clothing, Bedding, and Furniture

Why Some Fabrics are Warmer than Others

ONE of the principal purposes of clothing is to protect the body when the temperature of the atmosphere is low. "Warm" garments do not produce heat, but to a certain degree possess the property of retaining it. Heat is continually thrown off from the body and clothes act only as an obstacle to its escape.

The property in various fabrics of absorbing or removing the moisture excreted by the skin and transferring it to the air largely determines the value of the warmth producing qualities of clothes. Garments which soak up and retain water soon become damp from perspiration and lose the power of holding heat, as damp clothing is a good conductor of heat.

Small open spaces in the weave also affect the warmth of materials, for they are filled by air which is a poor conductor of heat. Fabrics with rough surfaces are generally warmer than those that are smooth, for a rough surface stimulates the skin and increases the circulation of the

blood. The warmth of clothing also depends somewhat upon the color of the garment, as black and dark colors absorb more heat from external sources than white and lighter shades.

Materials Used for Clothing

Garments are generally made of either cotton and linen derived from the vegetable kingdom, or wool and silk, from the animal kingdom.

Cotton is durable, does not shrink in washing, is a poor absorbent of water, and rapidly conducts heat away from the body.

Linen is also a good conductor of heat and a poor absorbent of moisture.

Wool is an extremely poor conductor of heat, absorbs water and removes it rapidly.

Silk is a non-conductor of heat, but less absorbent than wool.

As moisture from perspiration is quickly removed by wool, underclothes made from this fabric give the best protection to the body and are warm and dry even after exercise.

Ordinary cotton is not a good material for undergarments for it soaks up the perspiration and becomes wet. But it has some advantages as it is cleanly, does not irritate the skin, and shrinks less than wool. A fabric which becomes wet after profuse sweating chills the surface of the skin and may lower the temperature of the body so as to be dangerous to the health. It is possible now, how-

ever, to obtain winter underclothing made of cotton which has about the same absorbent power as wool and none of its disadvantages.

Weight of Clothing

As materials obtained from animals hold heat better than those from vegetable substances, it can readily be seen that thick and heavy clothing does not necessarily give the best protection to the body. It is a fact that garments made of non-conducting light materials are more comfortable, hygienic, and warmer than heavy clothing of other fabrics, and there is always the danger that heavy covering on the body will induce sweating and cause the individual to throw off a portion of the weight at a time when the body can easily be chilled.

In hot weather, clothing should be as light and loose as practical so as not to interfere with the ventilation of the skin, and when the external temperature is higher than that of the body only white or very light colored materials should be used.

Clothing for Open-air Life

Clothing, particularly when intended for open-air life, must give proper protection to the body against the wind and be of such material and color as will best hold the air over the surface of the skin at a uniform temperature. The various garments should interfere as little as possible with the function of the skin, and should not have an irritating effect upon it, nor produce injurious pressure on

No. 128. Fresh-air babies: a way of dressing and protecting little children in cold weather. (*Courtesy of Dr. W. P. Northrup.*)

any part of the body. Children should be clothed in woolen materials and their legs, arms, neck, and chest as well protected as other parts of the body (see Illustration No. 128) for they lose heat rapidly and are easily chilled. This is because of the rapid circulation of the blood in youth, and because the surface of their bodies is larger in proportion to its bulk than that of the adult.

The clothing selected for protection when sitting in a reclining chair out of doors should be of light weight but warm. For winter weather medium weight underclothes of wool or linen mesh should be worn next to the skin and over these a sweater which buttons in front. The ordinary weight street clothing covered by a fur coat complete the outfit. A fur coat is a necessity as even the cheapest of skins is the warmest material obtainable for an outer garment. A new fur coat can be purchased for twelve or fifteen dollars, or a canvas coat lined with sheepskin can be bought for even less and gives the same protection. The sleeves of a fur coat should be lined with fur and closed at the bottom with an elastic string.

Leather leggings and woolen tights may be used as extra garments and are a great comfort when taking exercise on cold days. Leather coats are suitable for very cold and stormy weather as the wind cannot penetrate through them.

In very cold weather and on windy days extra wraps should always be at hand for the use of those sitting out of doors. The chair should be placed in a sheltered position out of the wind and care taken to wrap up warmly as

No. 129.—How to wrap up warmly for sitting out of doors. First, place a rug or comfortable on the chair, and then over this a double blanket extended full length, allowing the free end to rest on the floor.

shown in Illustrations Nos. 129 and 130. For extra protection against the wind there can be purchased a very cheap hooded cape made of quilted crinkled fibre paper which protects the shoulders, back, and sides of the head. It fits snugly around the neck, is a non-conductor of heat, and forms a good wind shield.

How to Protect the Hands

Those who wish to use their hands in writing or other work while sitting out of doors in cold weather should wear thin, well fitting cotton gloves, covered by knitted woolen gloves, with the ends of the fingers and thumbs cut off and bound to prevent unraveling. For ordinary weather and when not at work the hands can be protected

No. 130.—How to wrap up warmly for sitting out of doors. Second, after seating yourself, draw up the free end of the blanket, tuck it in at the sides, and spread a steamer rug over all.

No. 131.—Foot warmers made of sheepskin and lined with a fluffy fleece, which can be slipped over regular shoes. (*Courtesy of W. C. Leonard & Co.*)

by heavy fur gloves or woolen mittens with long woolen wristlets. Never use tight gloves of any kind in cold weather, or tight sleeves with pressure under the shoulder

joint, as they restrict the circulation of the blood and cause the hands to grow cold.

How to Protect the Feet

The amount of protection necessary to keep the feet warm in cold weather varies greatly with the individual. Some require only woolen stockings and loose, comfortable shoes, with a pair of ordinary rubbers or high arctics when there is rain or snow. Others cannot wear woolen stockings next to the skin, but must use cotton or lisle thread under them. Men often put their trousers inside their arctics or wear leggings. When these means are not sufficient to keep the feet from becoming cold, felt shoes should be tried. Sheepskin moccasins (see Illustration No. 131) made from selected skins with the natural wool on the inside, or soft leather shoes covered by large fur-lined leather shoes are very warm and comfortable. Many persons use hot water bags and soapstones to keep the feet warm but they are not very satisfactory for continuous use as they may cause chilblains.

Foot-muffs made of fur or of cotton quilts sewed up like a bag can be made or purchased, and for very cold days when sitting out the muff can be placed in a wooden soap-box with hot bricks beside it and newspapers wrapped about it, to fill in the empty space. Home-made foot-muffs should be about two feet square and shaped like a bag into which the feet can be thrust. They are usually made of five or six alternate layers of cotton batting and newspapers, are lined with outing flannel, and covered on

No. 132.—A home-made shoulder cape made from a rectangular piece of flannel.

the outside with canvas. All foot covering should be loose, and suspenders used instead of circular elastic garters, as tight shoes or anything which restricts the circulation of the blood causes the feet to grow cold quickly for they depend upon the blood for their temperature and produce but little heat in themselves.

Clothing for Outdoor Sleeping

When sleeping out of doors on very cold nights, it is necessary to dress for bed. Various methods are used in order to sleep in comfort, and the clothes suggested here should be tried by beginners, although after a little experience outdoor sleepers usually devise their own way of dressing. It should be remembered that some persons need much more clothing than others, and it is wise to experiment until a comfortable costume is found. At first, try a suit of warm underwear, with pajamas and ordinary short length cotton stockings into which the pajama legs can be tucked; over the stockings use eiderdown boots or heavy lumbermen's socks, and protect the shoulders with a sweater or shoulder cape made of double-faced eiderdown. Those who do not like pajamas should try a woolen undershirt, a sweater, a long outing flannel nightgown or bathrobe, and knitted slippers.

A shoulder cape like the one shown in Illustration No. 132, may be made in five minutes from a rectangular piece of flannel or a half yard of double-faced eiderdown. Cut the cloth to be used twenty inches wide by thirty inches long, and fasten the two ends of each of the short sides together with a stitch or a safety pin; then slip the

No. 133.—Open-air sleeping hood and cape of shaker flannel, held in place by elastic bands. (*Courtesy of the Cabinet Manufacturing Co.*)

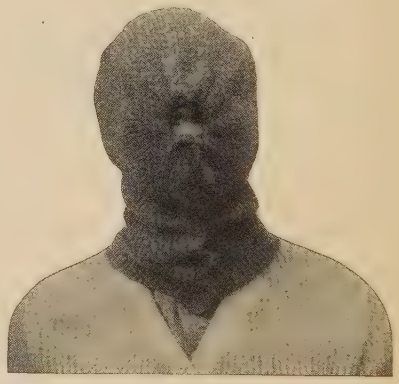
No. 134.—A sleeping hood showing the face partially exposed. (*Courtesy of the Vizor Knitting Co.*)

scalp and interferes with the circulation of the blood. A knitted skull cap, long enough to be pulled down to the end of the nose and over the ears, gives good protection; or a knitted helmet covering the whole of the head, face and neck, with the exception of a small opening for the nose and mouth can be used. (See Illustrations Nos. 134 and

arms through the holes thus made and pin the upper edge around the neck. The cap shown with this cape is an ordinary stocking cap or skating toque which may be knit at home.

How to Protect the Head

The head covering should be light, porous, and without a tight rim that presses upon the



No. 135.—A sleeping hood closed by a shirr string, to shield the entire face except the nostrils.

135.) A hood shaped like an old-fashioned sunbonnet is also very warm and comfortable, and can be made at home from eiderdown or outing flannel by using as many thicknesses of the material as may be needed. It should cover the head, and be drawn in closely around the neck with a wide flare over the shoulders, and it can be held in position by elastic bands passing under the arms. The flare of the hood should have a draw-string at the edge, which can be drawn in so as to pucker the cloth over the face, as is shown in Illustration No. 133. These hoods and capes can also be made of light weight canvas, lined with outing-flannel or eiderdown, but care must be taken to see that they are well fitted around the neck. When lying on one side with the face on a pillow, the nose usually keeps warm. If it grows cold when lying on the back, draw a cap down over the eyes until it covers the nose, or use a small piece of flannel to cover the top, held by elastic bands from the ears. *Never cover the head with the bedclothes* or allow any cloth to interfere with the inhaling of fresh air. If the breath,

No. 136.—An Angora wool cap in one piece, very light and warm, arranged to be worn either as a helmet or cap. (*Courtesy of W. C. Leonard & Co.*)

No. 137.—To protect the head from drafts, box in the head of the bed and use two pillows placed in the form of an inverted V.

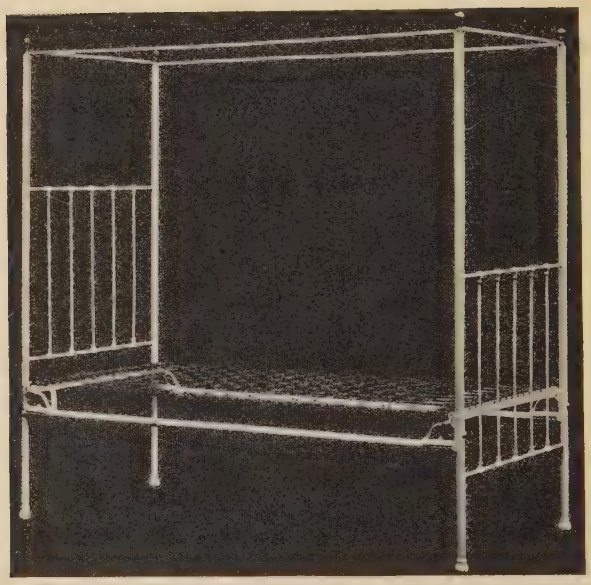
as it is expelled from the nose or mouth, comes in contact with the bedclothes on very cold nights it will form icicles. Chapping of the face during the night can be prevented by using cold cream or vaseline about the nose and lips.

Arrangement of Pillows

Two pillows should be used for protection and comfort when sleeping out of doors in cold weather. Place them in the form of an inverted V with the apex at the top of the bed. The head should rest at the point where the two pillows meet. This position allows the shoulders to nestle between the pillows, and protects them from the cold wind which will otherwise find its way under the bedclothes. The head of the bed should be shielded from the wind or a strong draft by placing it close to the protected end of the shelter, or by boarding up the end of the bed, as is shown in Illustration No. 137. This can also be accomplished by covering the head of the bed with a canvas hood, supported on barrel hoops attached to the bedstead, or hung by a rope from the ceiling.

The Bed and Bedding for Outdoor Sleepers

An ordinary iron bedstead, three feet six inches wide, with a woven wire spring and a moderately thick mattress are generally used for outdoor sleeping. (See Illustrations Nos. 138, 139, and 140.) The bedstead should be fitted with small rubber-tired wheels or large castors so that it can be rolled about easily. A good hair mattress is most desirable, but when it cannot be obtained, a vegetable fibre mattress with a cotton top can be bought for as low as four dollars, or a good cotton mattress, for about ten dollars. In cold weather two mattresses with several layers of newspaper between them should be used to prevent the heat of the body from escaping below.



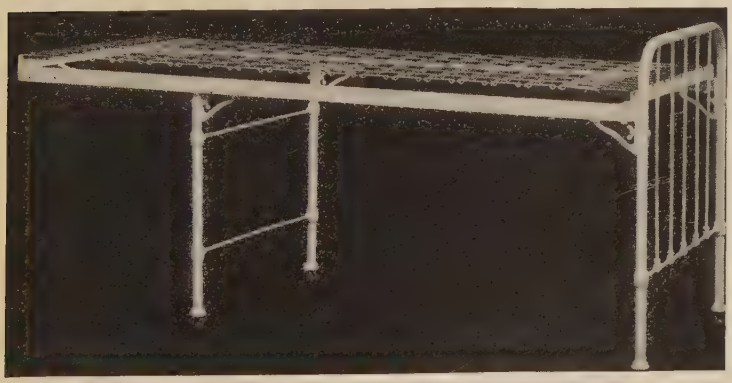
No. 138.—A simple, steel frame bedstead for outdoor sleeping, with supports for a mosquito bar. (*Courtesy of Richardson, Wright & Co.*)

Persons who like heavy bed covering may use blankets, placing as many layers over the bed as desired for warmth. Those who cannot stand heavy covering can use down, lamb's wool, or cotton-filled comforts, which are very warm but light. These can be purchased, or the material for wool or cotton comforts obtained, for about two dollars and warm satisfactory covering made in the home.

Paper blankets that will wear fairly well can be purchased for fifty cents. They are sanitary, clean, and whole-

some; do not absorb moisture and weigh less than a pound. The soft and pliable variety fold compactly and can be carried by travelers. With ordinary care, paper blankets will last for a season and give extraordinary protection because of their non-conducting qualities. They can also be used between the spring and mattress to protect the bed from below. The edges should be bound with tape to give them better wearing qualities. One variety is made with a crinkled fibre and weighs about one-half pound. It is said to be as strong and pliable as cloth, and being crinkly, does not allow the other bedclothes to slip off. Another blanket is made by a special process from fibrous paper and has a soft kid finish to prevent it from slipping.

A warm bed cover which combines the softness of a



No. 139.—A bedstead which can be used by persons who wish to sleep with their head outside the window. (*Courtesy of Richardson, Wright & Co.*)

blanket and the non-conducting properties of paper can be made at home by using a large pair of cotton blankets and filling them with crepe paper. To make this, take the largest pair of cotton blankets that can be conveniently obtained, a box of crepe paper and a skein of yarn. Spread out one of the blankets on a large table or the floor, and lay the crepe paper upon it, first a strip lengthwise and then a strip crosswise, making a thickness of five or six layers. Place the top blanket over the paper and tuft with the yarn, making the knots about four inches apart. The paper should reach from top to bottom and to the full width of the blanket if for use on a double bed, or to within six or eight inches of the sides if it is to be used on a single bed. A very cheap, light, and warm covering with the same properties can be made with newspaper placed between two thicknesses of outing flannel and then quilted.

The Klondike Bed

This is a method of arranging the bed covers to form a sleeping bag into which a person can slide from the upper end of the bed, the idea being to keep the cold air and wind from getting under the blankets. To make the Klondike bed (see Illustration No. 140), place over the mattress an old blanket or a cotton bed pad of the same width as the mattress, and on this, ordinary bed sheets or blanket sheets. Make the bed in the usual way, allowing its covers to fall loose on every side. Then gather up the coverings on one side and pass them beneath the pad to the centre of the bed, and follow this by doing the same on

No. 140.—The Klondike Bed. To make a sleeping bag with the bedclothes; first, tuck all the covers except the outside blanket under a bed pad and then tuck the top cover under the mattress.

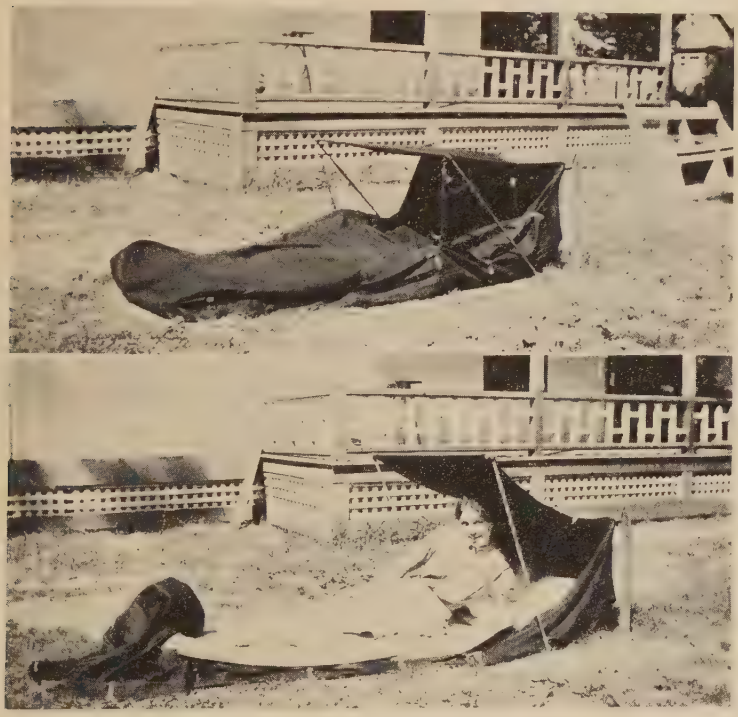
the opposite side and at the foot of the bed. The entire bed is last covered by a heavy blanket or quilt which is tucked in under the mattress.

Another method of making a sleeping bag from bedclothing is to place two heavy blankets, one on top of the other, full width across the mattress with half of each blanket extending over the opposite sides of the bed on to the floor. On the top of the blankets resting on the bed lay lengthwise a thin, washable, double blanket as a bed sheet. Cover this with two or three heavy double blankets also lengthwise, allowing sufficient material at the bottom to tuck in well. Then fold over the bed the flaps of the two blankets placed crosswise and tuck in at the opposite sides. A bed made in this way cannot be easily disarranged but must be entered by sliding in at the top.

Damp Bedclothes

Care should be taken before retiring when sleeping outdoors, to see that the bedclothes are not damp. All clothing is used in order to prevent the loss of heat from the body, and should therefore be non-conducting as far as possible. Bedclothes like garments, when damp lose the property of holding the natural heat of the body, which if allowed to escape, may produce a chill which is dangerous and often causes illness. A woolen horse blanket with an outside canvas cover can be used to protect the bedding in wet and stormy weather.

In cold weather, the outdoor sleeper should, if possible, get into the bed in a warm room, and have some one roll him



No. 141.—The Robin Hood sleeping bag can be opened when making the bed, and has an umbrella attachment for protecting the head.

out of doors. When this cannot be done, use a warm dressing-gown in going back and forth from the dressing-room to the porch, and warm the bed by placing in it for a few minutes before retiring, a hot water bag, hot bricks, soapstones or bottles filled with hot water. In some instances,

it is well to leave a hot stone or bottle wrapped in flannel at one corner of the bed where it will throw off heat slowly during the night.

Sleeping Bags

In very severe weather, sleeping bags are used by those who are very susceptible to the cold. These bags can be bought for about fifteen dollars or can be made at home by sewing blankets together around three sides and leaving the top open. Sleeping bags when properly made give much more protection, and hold the heat of the body far better than a loose bed covering, and they are also adapted for use in moderate weather as well as for intense cold. They should be both moisture and wind proof, but made so that they can be aired, washed, and dried easily.

The Robin Hood Sleeping Bag

The sleeping bag, shown in Illustration No. 141, is made of a brown, pliable, waterproof Belgian canvas, and can easily be folded and carried about. The sides form a box to hold and protect a mattress, blankets, and a pillow, and the sides are fastened together by means of snaps and rings in the outer edge. A long flap which is sewed to the bottom of the body of the bag can be drawn up over the head and arranged to form a canopy or hood. This is supported by a rod which may be adjusted to any angle, and is held in place by a strap with a buckle fastened from the lower border of the body of the bag.

No. 142.—Sleeping bags made of heavy woolen cloth prevent the wind from finding its way under the bedclothes. (*Courtesy of F. C. Huyck & Sons.*)

The Kenwood Sleeping Bag

The Kenwood bags (see Illustration No. 142) are made with heavy waterproof canvas covers, strongly sewed together, and fitted with a flap or fly around the top, which acts as a windbreak and as an extra protection against rain. Inside the canvas is a thick, strong, woolen bag, having a nap on each side, and within the woolen bag is still another of softer material. The combination of the

three bags with the air space between gives warmth, and each one can be removed, aired, washed, and quickly dried.

A Baby's Sleeping Bag

A bag with a cap, for the protection of babies and young children when sleeping out of doors, has been designed by Mrs. J. A. Rawson, Jr., and can easily be made at home. This bag is twenty-six inches wide by forty-six inches long. The outer cover is of woolen material and the inner lining of a softer fabric, with a layer of cotton batting between them. To make the bag:

1. Lay out the inner and outer cover with the cotton batting between, and close the edges all around with a slip stitch.

2. Close the front at the bottom by turning up the lower edge for eight inches and sewing it up at the sides.

3. Find the centre of the top of the bag and measure three inches each way.

4. From these points measure twelve inches further in each direction, and fold the material forward toward the centre, sewing the top from the twelve-inch point to the one near the centre. The corners thus formed cover the shoulders, and the six-inch space in the centre is for the head where the cap is attached. The remaining length forms double-breasted flaps, which may either be buttoned or fastened with heavy safety pins.

The cap is made from a piece of cloth nine inches wide by eighteen inches long, folded crosswise. Sew a seam across the top from the fold to the outer edge, turn the

No. 143.—An ordinary clothes-basket lined with cotton or wool is a good safe crib for the baby's outdoor nap. (*Courtesy of Dr. W. P. Northrup.*)

cloth so that the seam forms the centre of the back, and from the bottom end of this seam measure three inches in each direction, and connect the edge between these points on the cap to the six-inch space at the centre of the bag, and sew together. The projecting parts thus left on the

No. 144.—Make an inclosure around a mattress with a tennis net for baby's fresh-air life in warm weather. (*Courtesy of Dr. W. P. Northrup.*)

cap may be turned forward for protection over the face, or rolled back as desired. Fasten tapes at the neck, and the bag is complete.

The Providence Bag

This is a cheap bag (see Illustration No. 145) which is used both as a sleeping bag and for protection in sitting

out of doors during cold and windy days. It can be made at home and the material will cost about two dollars. The bag should be about six feet long by two feet wide, and the inner lining and outer cover of outing flannel or some woolen material. Before sewing up the sides, lay the cloth for the lining out flat, cover this with a layer of cotton

No. 145.—A Providence sitting-out bag made of alternate layers of flannel and newspapers.

batting, seven layers of newspaper, a second layer of cotton batting, and then the cloth for the outside cover. These should all be quilted together and the sides sewed up. One side may be left open for a short distance and fastened with tapes, as this arrangement makes it easier to get into the bag.

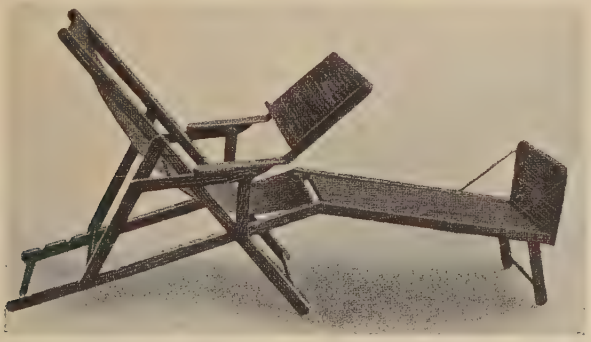
Furniture for Fresh-air Apartments

Furniture to be used in the open air should be made of material which is not affected by moisture. It should be as light as possible and free from unnecessary ornamentation so as not to catch and hold dust, and the heavy articles placed on castors so that they can be easily moved about and cleaned on all sides.

No. 146.—A swinging canvas bed can be used for outdoor sleeping.

Upholstered furniture, except when covered with leather, is not desirable, but if used should be provided with removable covers which can be laundered. Mattresses, pillows, extra couch and chair cushions, should also have

outside covers that can easily be removed and washed. Carpets, mats, curtains, and other hangings should all be of washable material. Carpets should not be tacked down but be made in the form of rugs or strips which can be easily hung up and dried. There should be a free margin around the entire room. Hairy mats and carpets with heavy nap catch large quantities of dust and are not suitable for this purpose, but floor coverings of grass matting



No. 147.—A wooden frame reclining chair, with a reading board and foot rest, which can be easily adjusted to various positions. (*Courtesy of W. C. Leonard & Co.*)

are very good, or small domestic or oriental rugs which can be easily washed.

The furniture should consist of an iron frame bed, a bureau, washstand, and table, finished with enameled paint. If pictures are used on the walls for decoration they should be framed with a smooth frame and sealed on the back with waterproof paper. Elaborate picture frames and

No. 148.—The "Adirondack Recliner," an easily adjusted, comfortable chair for sitting out in the open air, and especially adapted for invalids.

intricate ornaments are unsuitable for open apartments. Durable chairs and tables for open buildings are made of willow, wicker, reed, woven grass, or rattan. The ordinary kitchen chair, with a coat of stain or white enamel, is also satisfactory. Rustic hickory furniture, made of young saplings to form the frameworks and woven strips of inside bark for the seats and backs, are especially appropriate for this use. Bent wood cane chairs and adjustable iron frame and cane couches, with removable foot pieces which can be converted into chairs, are convenient for open verandas.

An easy-chair is a great comfort to those sitting out during the day. A steamer chair is easily obtained and gives good service. The canvas variety with a wooden frame can be bought for one dollar or the cane-seat extension chair for three dollars. A more durable chair with an iron frame, which can be transported and used in a rough manner without danger of breakage, is made for this purpose and can be bought for twenty-five dollars.

When sitting out on cold days, the chair must be covered

No. 149.—A tent cot which can be used for camping, sleeping on a roof, or in other positions where it is not convenient to erect a fresh-air shelter. (*Courtesy of the Enterprise Bed Co.*)

No. 150.—A combined tent and couch large enough for two persons. Portable and convenient for outdoor sleeping purposes. (*Courtesy of the Corona Manufacturing Co.*)

with a pad of some thick, closely woven, warm material to prevent cold currents of air coming up from below. A fur rug is also good for the purpose, or several layers of blankets with newspapers between them. A person sitting out of doors should have a table handy on which to keep books and other things used for amusement or work. An adjustable table, the top of which can be swung before or away from a chair or bed, is a great convenience

and can be used as a book-rest when the hands are under cover.

The Tent Cot

A tent cot (see Illustrations Nos. 149 and 150) is a combination outdoor bed and shelter for temporary use, and is a convenient contrivance for experimenting in open-air sleeping. It consists of a simple canvas cot to which a frame is attached, supporting a small tent for protection against the weather. It has many advantages for it can be quickly taken apart, folded, stowed away, or transported, and as it is light, weighing only from twenty-five to fifty pounds, it can be moved for short distances, and its position and exposure changed without being taken apart.

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